TEXAS WATER DEVELOPMENT BOARD
REQUEST FOR RESEARCH AND PLANNING FUNDS
BY THE
NORTH TEXAS MUNICIPAL WATER DISTRICT
ON BEHALF OF
THE STUDY COMMISSION ON REGION C WATER SUPPLY

SUBMITTED ON DECEMBER 18, 2008

Prepared by NTMWD
on behalf of the Study Commission on Region C Water Supply

TEXAS WATER DEVELOPMENT BOARD
REQUEST FOR RESEARCH AND PLANNING FUNDS
FOR THE STUDY COMMISSION ON REGION C WATER SUPPLY

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Application Instruction Sheet

I. GENERAL INFORMATION

☑ 1. Legal name of applicant(s).

☑ 2. Regional Water Planning Group

☑ 3. Date that political subdivision was designated as representative of the Study Commission on Region C Water Supply to receive funds for all or part of the cost to carry out the legislative charges in Senate Bill 3 Section 4.04 of the 80th Legislative Session and the scope of work as published on pages 8838 through 8844 of Volume 33, Number 43, of the Texas Register published on October 24, 2008.

☑ 4. Authority of law under which the applicant was created.

☑ 5. Applicant's official representative, Name, Title, Mailing address, Phone number, Fax number, if available, E-mail Address, and Vendor ID Number.

☑ 6. Is this application in response to a Request for Proposals published in the Texas Register? Yes ☐ No ☐

☑ 7. If yes to No. 6 above, list document number and date of publication of the Texas Register.

☑ 8. Total grant funds requested from the Texas Water Development Board.

☑ 9. Detailed statement of the purpose for which the money will be used. (Not to exceed 1 page.)

II. PROJECT INFORMATION

☑ 10. Scope of Work

☑ 11. Task Budget

☑ 12. Expense Budget

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III. PROOF OF NOTIFICATION

☑ Proof of notification

Supplemental funding notification will be the same as "Initial scope of work grant applications". Eligible applicants requesting funds to develop initial scope of work must, not less than 30 days before board consideration of the application, provide notice that an application for planning assistance is being filed with the executive administrator by:

(1) publishing notice once in a newspaper of general circulation in each county located in whole or in part in the regional water planning area; and

(2) mailing notice to each mayor of a municipality with a population of 1,000 or more or which is a county seat and that is located in whole or in part in the regional water planning area, and to each county judge of a county located in whole or in part in the regional water planning area.

Notice content and copies.
The notice shall include:

- the name and address of the eligible applicant
- the name of the applicant's manager or official representative;
- a brief description of the regional water planning area;
- the purposes of the planning project;
- the board's name, address, and the name of a contact person with the board;
- a statement that any comments must be filed with the executive administrator and the applicant within 30 days of the date on which the notice is mailed or published.

Prior to action by the board, the applicant must provide one copy of the notice sent, a list of those to which the notice was sent, the date on which the notice was sent, copies of all notices as published showing name of the newspaper and the date on which the notice was published.

I. GENERAL INFORMATION

1. Legal name of applicant(s).

North Texas Municipal Water District

2. Regional Water Planning Group

Study Commission on Region C Water Supply

3. Date that political subdivision was designated as a representative of the Study Commission on Region C Water Supply to receive funds for all or part of the cost to carry out the legislative charges in Senate Bill 3 Section 4.04 of the 80th Legislative Session and the scope of work as published on pages 8838 through 8844 of Volume 33, Number 43, of the Texas Register published on October 24, 2008.

NTMWD was designated by action of the Study Commission on Region C Water Supply to receive funds during the Commission's meeting on November 12, 2008. A copy of the draft minutes are attached in Exhibit A.

4. Authority of law under which the applicant was created.

The North Texas Municipal Water District was created by virtue of Article VI, Section 59, of the Texas Constitution as a Conservation and Reclamation District.

5. Applicant's official representative, Name, Title, Mailing address, Phone number, Fax number, if available, E-mail Address, and Vendor ID Number.

James M. Parks
Executive Director
North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098
Phone – (972) 442-5405
Fax – (972) 295-6440
E-Mail – jparks@ntmwd.com
Vendor ID – 17560042586.000

6. Is this application in response to a Request for Proposals published in the Texas Register?

Yes ☐ **No** ☑

7. If yes to No. 6 above, list document number and date of publication of the Texas Register.

8. Total grant funds requested from the Texas Water Development Board.

$2,388,317.00

9. Detailed statement of the purpose for which the money will be used.

The grant funds would be used to carry out the legislative charges in Senate Bill 3 Section 4.04 of the 80th Legislative Session and the scope of work as published on Pages 8838 through 8844 of Volume 33, Number 43, of the Texas Register published on October 24, 2008.

II. PROJECT INFORMATION

10. Scope of Work

The Scope of Work may be found in Exhibit B.

11. Task Budget

The task budget may be found in Exhibit C.

12. Expense Budget

The expense budget may be found in Exhibit D.

13. Time Schedule

The time schedule may be found in Exhibit E.

III. PROOF OF NOTIFICATION

Proof of notification

The North Texas Municipal Water District and the Northeast Texas Municipal Water District provided notice with regards to this application requesting funds to carry out the legislative charges in Senate Bill 3 Section 4.04 of the 80th Legislative Session and the scope of work as published on pages 8838 through 8844 of Volume 33, Number 43, of the Texas Register published on October 24, 2008 as follows:

(1) publishing notice once in a newspaper of general circulation in each county located in whole or in part in the Region C and Region D water planning area; and

(2) mailing notice to each mayor of a municipality with a population of 1,000 or more or which is a county seat and that is located in whole or in part in the Region C and Region D water planning area, and to each county judge of a county located in whole or in part in the Region C and Region D water planning area.

The notice included the following:

- the name and address of the eligible applicant
- the name of the applicant's manager or official representative;
- the purposes of the project;
- the board's name, address, and the name of a contact person with the board;
- a statement that any comments must be filed with the executive administrator and the applicant within 30 days of the date on which the notice is mailed or published.

Submitted by: James M Parks

James M. Parks
Administrator
Study Commission on Region C
Water Supply

Date: 12/18/08

EXHIBIT A

EXHIBIT A

Study Commission on Region C Water Supply

MINUTES OF AN OPEN PUBLIC MEETING
November 12, 2008

The Study Commission on Region C Water Supply (Study Commission) met in an open public meeting on Wednesday, November 12, 2008, at 1:00 P.M. The meeting was held at the Region 8 Education Service Center at 2230 North Edwards Avenue, Mount Pleasant, Texas. Notice of the meeting was legally posted.

I. CALL TO ORDER

Representative Stephen Frost called the meeting to order at approximately 1:00 P.M.

II. WELCOME/INTRODUCTION

Senator Florence Shapiro and Representative Frost introduced each member of the Study Commission. The following members were in attendance:

The Honorable Florence Shapiro	Mr. Thomas Duckert
The Honorable Stephen Frost	Mr. Richard LeTourneau
The Honorable Jodie Laubenberg	Mr. Jim Parks

Also in attendance was Dee Farmer from Senator Kevin Eltife's office. Additionally, Carolyn Brittin and Angela Masloff of the Texas Water Development Board (TWDB) were in attendance. The registration lists signed by guests in attendance are attached.

III. ACTION ITEMS FOR CONSIDERATION

a. ADOPTION OF MINUTES OF JULY 29, 2008 MEETING

On a motion by Representative Frost and a second by Jim Parks, the Study Commission unanimously adopted the minutes from the July 29, 2008 meeting.

b. DISCUSSION AND POSSIBLE ACTION ON MEETING MINUTES PROCEDURE

On a motion by Representative Frost, and a second by Representative Jodie Laubenberg, the Study Commission unanimously approved a proposal to make audio recordings of each Commission meeting. Mr. Parks agreed to store the tapes on an intermediary basis, and Carolyn Brittin confirmed that the TWDB would undertake the archival process.

Prior to voting on the motion, comments were received from the following individuals:

i. Red Birdsong
ii. Carolyn Brittin
iii. David Nabors

c. DISCUSSION AND ADOPTION OF TWDB ADMINISTRATIVE TIMELINE TO COMPLETE WORK OF STUDY COMMISSION

Ms. Brittin of the TWDB presented to the Commission the newly drafted timeline for the Commission's study. The timeline was based on the assumption that a contractor would be selected immediately and begin work no later than February 2009.

Ms. Brittin also discussed the steps that the Commission would have to take in order to obtain the $500,000 TWDB grant. The TWDB has included an exceptional item in its appropriations request for $2 million, for the purpose of supplementing the Commission's contract with a consultant. These funds would be available in September 2009, and the Commission would have to amend the contract at that time.

On a motion by Representative Laubenberg, seconded by Richard LeTourneau and Tom Duckert, the Commission unanimously adopted the proposed timeline.

d. REVIEW OF REQUEST FOR QUALIFICATIONS (RFQ) SUBMISSIONS RECEIVED RESPONSIVE TO RFQ AND POSSIBLE SELECTION OF CONSULTANT CONSISTENT WITH RFQ

Mr. Parks gave a brief overview of the process undertaken to solicit Request for Qualifications (RFQs) from consulting firms willing to enter negotiations with the Commission. Mr. Parks further discussed the requirements for the applying firms.

Upon the suggestion of Senator Shapiro, and by the agreement of the Commission members, the Commission recessed at approximately 1:45 P.M. to review the five Statement of Qualifications (SOQs) received by the Commission.

e. DISCUSSION AND AUTHORIZATION TO DEVELOP A PROPOSAL WITH THE SELECTED CONSULTANT CONSISTENT WITH THE APPROVED SCOPE OF WORK

The Commission members resumed meeting at approximately 2:30 P.M. The Commission members reviewed the tabulation procedures used to select a consulting firm with which to enter negotiations. Espey Consultants, Inc. (Espey) received the highest tabulated score, and so was selected to be negotiated with first. If the Commission cannot reach agreement with Espey, then the Commission would enter negotiations with the second-highest ranked firm.

Representative Laubenberg motioned that the Commission enter into negotiations with Espey. Tom Duckert seconded the motion. Without objection, Representative Frost amended the motion to also accept the SOQ submissions in the order ranked by the Commission. The Commission unanimously adopted the amended motion.

f. DISCUSSION, DESIGNATION, AND AUTHORIZATION OF ADMINISTRATIVE OFFICER'S POLITICAL SUBDIVISION TO MAKE APPLICATION AND RECEIVE FUNDS AS REPRESENTATIVE OF STUDY COMMISSION

Representative Frost motioned that the Administrative Officer's political subdivision (NTMWD) with the help of the NETMWD be designated and authorized to submit a grant application to TWDB and receive subsequent grant funds to be used to carry out the legislative charges in Senate Bill 3 Section 4.04 of the 80th Legislative Session. Following a second by Representative Laubenberg, the motion was approved unanimously by the Commission.

IV. DISCUSSION ITEMS

a. DISCUSSION/SELECTION OF DATE, TIME, AND LOCATION OF NEXT MEETING

It was the consensus of the Study Commission members to schedule the next meeting for January 12, 2008 at 1:00 P.M. in order to consider the results of negotiations with Espey. The meeting will be held in Room 1-111 of the William B. Travis Building at 1701 N. Congress, Austin, Texas.

b. PUBLIC COMMENT

Mr. LeTourneau asked that the Commission invite the Sabine River Authority of Texas and the Sabine River Authority of Louisiana to a future Commission meeting in order to provide information to the Commission on water availability.

Representative Frost further suggested that other parties like the Texas Forest Service might have relevant input. Any suggestions on potential presenters should be sent to Mr. Parks. These presentations are to be separate from the Scope of Work-related activity.

Public comments were received from the following individuals:

i. George Frost
ii. Stanley Jessee
iii. Gary Cheatwood, Jr.
iv. Gary Cheatwood, Sr.
v. Henry "Corky" White
vi. John Purviance
vii. John McConnell
viii. Sharron Nabors
ix. Max Shumake
x. David Parkhill
xi. David Nabors
xii. Nancy Clements
xiii. Charleen Granberry

V. ADJOURN

There being no further business, the meeting of the Study Commission on Region C Water Supply adjourned at approximately 4:00 P.M.

SENATOR FLORENCE SHAPIRO
Co-Presiding Officer

REPRESENTATIVE STEPHEN FROST
Co-Presiding Officer

EXHIBIT B

Exhibit B
Scope of Work

The existing and available work of Region C and the Texas Water Development Board (TWDB) is a major resource for Region C and will be utilized to the fullest extent possible. It is recognized that one objective of the Region C Water Plan was to demonstrate viable water supply alternatives available to the Region C Regional Water Planning Area. These alternatives include obtaining additional water supplies from Lake Texoma, Toledo Bend Reservoir, Lake Wright Patman, Lake O' the Pines, other existing supplies such as groundwater, or proposed reservoirs. The primary objective of this initial work element is to compile, organize, and summarize existing studies and analyses that have evaluated Region C water supply alternatives.

As such, the work described below will be prosecuted in a multi-phase approach. Phase I will focus upon an initial literature review, data gap analysis, and an initial socioeconomic impact analysis of studies related to selected five reservoirs:

1. Marvin Nichols
2. Wright Patman
3. Toledo Bend
4. Lake Texoma
5. Lake O' The Pines

A review will be made subsequent to this first phase of work pertaining to the viability of prosecuting the remaining work elements specific to these five reservoirs as a second Phase II of this study, or if a more comprehensive analysis of alternative studies (inclusive of these five reservoirs) should be performed as a Phase III of this study. The following work elements will proceed as part of these phases of work.

Phase I

Task 1. Water Supply Alternatives

Work will include the following:

SubTask 1.1 - Literature Review

1.1.1. Perform literature review via comprehensive analysis of reports and documents related to the stated subject matter and published or located (but not limited to) the following sources:

- State of Texas agencies including TPWD, TCEQ, TWDB or predecessor agencies;
- Federal agency reports including those produced by U.S. Geological Survey (USGS), U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, and U.S. Army Corps of Engineers;
- River Authority and Water Districts
- University studies
- Journal articles referenced in the following online databases:
- Applied Science and Technology Abstracts,
- Water Resource Abstracts.

Where possible, effort will be made to obtain all studies that have considered, evaluated, or proposed water supply alternatives for the Region C Planning Area, and will cover studies back to 1985. The project team will coordinate with the Study Commission to determine at what level the point of diminishing returns is located in order to manage expectations, and due diligence will be made to obtain all studies, including those not necessarily utilized in the state's Regional Water Planning Process.

1.1.2. **Deliverable 1.1A:** A comprehensive list will be compiled detailing each study, including a synopsis of each study, title, date of study, sponsor, author, type (technical vs. planning), subject (specific facility vs. water user water plan), and relevant information to the focus of this project.

1.1.3 **Deliverable 1.1B:** Compile a draft list of water supply alternatives for evaluation to be submitted to the Study Commission for review and comment.

1.1.4 Study Commission QA/QC. (Task Performed by Commission)

1.1.5 **Deliverable 1.1C:** Incorporate the Commission's suggested modifications to create a final list of water supply alternatives for submission.

1.1.6 **Deliverable 1.1D:** A brief SubTask report summarizing the results of this work element, including the report synopses and bibliography, will be submitted in a .pdf format. A presentation will also be made of the findings at the time of submittal, if requested by the Study Commission.

SubTask 1.3 - Data Gap Analysis

Assess results of previous work elements for potential gaps in information with respect to what additional studies might be undertaken to bridge those gaps.

1.3.1 Contact all of the major water providers in Region C to determine the availability of relevant studies.

1.3.2 Identify potential gaps in existing water supply plans and studies.

1.3.3 **Deliverable 1.3A:** Based on best professional judgment and coordination at the agency staff level, a preliminary set of recommendations for studies to bridge data gaps will be presented. A preliminary ranking will be performed to assess the analysis to be prosecuted in Task 2.

1.3.4 Study Commission QA/QC. (Task Performed by Commission)

1.3.5 **Deliverable 1.3B:** Incorporate comments from the Study Commission to develop draft scopes of work for additional studies and a ranking for Phase 1, Task 2 of this analysis. Prepare a brief report and data files summarizing the results of this work element will be submitted in a PDF format. A presentation will also be made of the findings at the time of submittal, if requested by the Study Commission.

Task 2. Project approach: Socioeconomic Impacts

SB 3 requires an analysis of the socioeconomic impact on areas in which water supply used to meet the water needs of Region C would potentially be located. These areas are herein referred to as the "Basin of Origin." Specifically, this impact determination should consider the effects on landowners, agricultural and natural resources, businesses, industries, and taxing entities. Further, SB 3 also requires the determination of the socioeconomic impact on the Basin of Origin of utilizing water from Wright Patman Lake to meet future water needs in Region C. Specifically, this impact will examine potential changes in water availability from the reservoir and the impact this may have on cities, business, and industries that rely on the reservoir for water supplies. This task while initiated during Phase I of this study, will be carried forward into Phase II or III as work progresses.

Work will include the following:

2.1 - Kick-off Meeting

To initiate Task 2 of the Project, Project Team Members propose to meet with the Study Commission and/or its designees to finalize the specific Scope of Services to complete Task 2 and to clarify and finalize the Study Commission's Goals and Objectives for the Task. During this meeting, the Project Team will request from the Study Commission the list of agencies or organizations the Project Team should approach to secure any additional reports or studies that are responsive to SB 3 requirements.

2.2 - Literature Review

2.2.1 Conduct a literature review of reports and/or analysis identified by the Study Commission and other reports and/or analyses which may be readily available related to the determination of the socioeconomic impact of the development and/or use of water supplies to the supply's Basin of Origin. Examine each report and/or analysis and prepare a memorandum which discusses the methodology employed and provides the Project Team's perceived strengths and/or weakness

of said methodology and results. Further, the Project Team will also identify any gaps within the reports and/or analyses and provide recommendations on how to bridge such gaps to the Study Commission. This examination will include, but not be limited to, the studies identified within the Draft List of Citations for Studies Related to Task 2 as identified within the Request for SOQs.

2.2.2 **Deliverable 2.2A:** Once completed, draft memorandum will be submitted to the Study Commission for review and comment.

2.2.3 Study Commission QA/QC. Upon review, the Project Team will request further guidance from the Study Commission on the methodology and/or techniques to be employed in determining the socioeconomic impacts related to Region C Water Supply Alternatives. *(Task Performed by Commission)*

2.2.4 **Deliverable 2.2B:** Submit Final Methodology Memorandum.

SubTask 2.3 - Identification and Evaluation of Socioeconomic and Demographic Impacts

After receiving further guidance and comments from the Study Commission, the Project Team will utilize the approved methodology and/or techniques to identify and evaluate the socioeconomic and demographic impacts to different economic sectors in areas where water supply alternatives would be or are located.

2.3.1 Identification of Impact Areas - Determine the areas of the State, down to the County level, that will be impacted by each water supply alternative (i.e., Basin of Origin).

2.3.2 Identification of Impacts - Once the impacted area has been identified, determine the types of short-term and long-term, positive and negative impacts that each area may experience, and the economic sectors that may be impacted. Economic sectors examined will include, but not be limited to, landowners, agricultural and natural resources, commercial business, industrial facilities, and taxing entities. Impacts measured will include, but not be limited to direct and secondary losses and/or gains in regional output, regional value-added, employment, local and state sales tax, property taxes, population, and other variables unique to a specific region. To the greatest extent possible, the Project Team will seek to quantify all of the identifiable economic, demographic, and social impacts. However, some social impacts, such as the cultural impact to a community due to the development of a reservoir for water supply, may not be quantifiable. In this case and where possible, qualitative data will be utilized to identify and measure the impact.

2.3.3 Analysis of Impacts - Once the impacts from the proposed water supply have been identified, utilize computer software to calculate the projected economic effect of each impact. The Project Team will likely utilize the IMPLAN software package in quantifying the economic impact. The IMPLAN software applies Input-Output Analysis as a means of examining relationships within an economy. This software captures monetary market transactions for consumption in a given

time period using actual data from local economies. Using both descriptive and predictive modeling, team members will calculate the multipliers applicable to each impact. A multiplier, named for the multiplicative effect that takes place in an economy following some initial stimulus, are used to determine the economic effect of an impact. Utilizing the multiplier enables the calculation of the direct, indirect, and induced benefits or costs of an activity, resulting in the quantification of the identified impact.

2.3.4 Calculation of the Net Economic Impact - Once each impact has been identified, calculate the net economic impact of the water supply alternative. In performing this task, consider positive and negative impacts to the Basin of Origin and determine the total net economic impact.

2.4 - Draft Report

2.4.1 **Deliverable 2.4A:** Develop a draft report and deliver report to the Study Commission, along with all associated tables, schedules, and/or data files. The draft report will detail the results of the literature review and the results of the identification and evaluation of the socioeconomic and demographic impacts to each water supply's Basin of Origin. Finally, the draft report will provide any recommendations for further analyses, including a draft scope of work, as deemed necessary by the Project Team.

2.4.2 Study Commission QA/QC. (Project Team will assist Commission)

2.5 – Finalize Draft Task Report

Deliverable 2.4B: Make appropriate changes and provide the Study Commission with the Final Report. After completion of the Final Report, make a public presentation of the final report results, if requested by the Study Commission.

Phase IIA

Work performed under Phase II of this study will carry on the analysis and review of the studies related to the development of projects related to the five reservoirs studied under Phase I of this project.

Task 1. Water Supply Alternatives

Work will include the following:

SubTask 1.2 - Summarization of Water Supply Alternatives

The information compiled from the Phase I, Task 1, SubTask 1.1 will be investigated with respect to individual water supply alternatives. Each of the studies from the previous task, as well as the water supply alternatives identified in the 2001 and 2006 Region C Water Plans, will be mined for information on water supply alternatives and that information aggregated *by water supply alternative*.

1.2.1 For each water supply alternative, a brief written summary will be provided. A compilation of *each* study's components attributing to the water supply alternatives will be developed and cross-referenced including the following components:

a. name of water supply alternative;
b. category/type of water supply alternative (e.g. reuse vs. groundwater);
c. water supply volume (e.g. firm yield) as calculated in accordance with TWDB's technical guidance in the regional water planning contracts (i.e. Exhibit B) which requires that firm yield be calculated under drought of record conditions;
d. detailed cost of water supply alternative as standardized by TWDB's technical guidance in the regional water planning contracts;
e. number and name(s) of entities who would develop the water supply alternative and number and name(s) of entities who would be supplied by the water supply alternative;
f. cross-reference for each version of each water supply alternative (e.g. title of study, year, and page number);
g. level of detail of study of the water supply alternative (e.g. planning level versus engineering level);
h. type of study (specific facility vs. water user water plan);
i. date of study;
j. study sponsor(s);
k. study author(s);
l. identification of whether the water supply alternative was a recommended water management strategy in the 2001 or 2006 Region C Water Plans;
m. conditions and terms for viability of the water supply alternative;

n. other attributes considered relevant to this Subtask as identified by the Study Commission or Contractor;
o. water quality of source;
p. permitting requirements;
q. environmental impact;
r. operational considerations (e.g., flood control, system operation, etc.); and
s. economic impact to both Regions C and D (e.g., gain/loss of jobs, industry, manufacturing, etc.).

Significant variations between attributes for different versions of the same water supply alternative will be characterized and clarified. Appropriate cross-references to the source plans or studies will be made for each water supply alternative.

1.2.2 **Deliverable 1.2:** A brief SubTask report and data files summarizing the results of this work element will be submitted in a PDF format. A presentation will also be made of the findings at the time of submittal, if requested by the Study Commission.

Task 2. Project approach: Socioeconomic Impacts

This task will carry on the work initiated in Phase I, Task 2, and will focus upon the studies related to the five reservoirs described therein. SB 3 requires an analysis of the socioeconomic impact on areas in which water supply used to meet the water needs of Region C would potentially be located. These areas are herein referred to as the "Basin of Origin." Specifically, this impact determination should consider the effects on landowners, agricultural and natural resources, businesses, industries, and taxing entities. Further, SB 3 also requires the determination of the socioeconomic impact on the Basin of Origin of utilizing water from Wright Patman Lake to meet future water needs in Region C. Specifically, this impact will examine potential changes in water availability from the reservoir and the impact this may have on cities, business, and industries that rely on the reservoir for water supplies.

Work will include the following:

2.1 - Kick-off Meeting

To initiate Task 2 of the Project, Project Team Members propose to meet with the Study Commission and/or its designees to finalize the specific Scope of Services to complete Task 2 and to clarify and finalize the Study Commission's Goals and Objectives for the Task. During this meeting, the Project Team will request from the Study Commission the list of agencies or organizations the Project Team should approach to secure any additional reports or studies that are responsive to SB 3 requirements.

2.2 - Literature Review

2.2.1 Conduct a literature review of reports and/or analysis identified by the Study Commission and other reports and/or analyses which may be readily available related to the determination of the socioeconomic impact of the development and/or use of water supplies to the supply's Basin of Origin. Examine each report and/or analysis and prepare a memorandum which discusses the methodology employed and provides the Project Team's perceived strengths and/or weakness of said methodology and results. Further, the Project Team will also identify any gaps within the reports and/or analyses and provide recommendations on how to bridge such gaps to the Study Commission. This examination will include, but not be limited to, the studies identified within the Draft List of Citations for Studies Related to Task 2 as identified within the Request for SOQs.

2.2.2 **Deliverable 2.2A:** Once completed, draft memorandum will be submitted to the Study Commission for review and comment.

2.2.3 Study Commission QA/QC. Upon review, the Project Team will request further guidance from the Study Commission on the methodology and/or techniques to be employed in determining the socioeconomic impacts related to Region C Water Supply Alternatives. *(Task Performed by Commission)*

2.2.4 **Deliverable 2.2B:** Submit Final Methodology Memorandum.

SubTask 2.3 - Identification and Evaluation of Socioeconomic and Demographic Impacts

After receiving further guidance and comments from the Study Commission, the Project Team will utilize the approved methodology and/or techniques to identify and evaluate the socioeconomic and demographic impacts to different economic sectors in areas where water supply alternatives would be or are located.

2.3.1 Identification of Impact Areas - Determine the areas of the State, down to the County level, that will be impacted by each water supply alternative (i.e., Basin of Origin).

2.3.2 Identification of Impacts - Once the impacted area has been identified, determine the types of short-term and long-term, positive and negative impacts that each area may experience, and the economic sectors that may be impacted. Economic sectors examined will include, but not be limited to, landowners, agricultural and natural resources, commercial business, industrial facilities, and taxing entities. Impacts measured will include, but not be limited to direct and secondary losses and/or gains in regional output, regional value-added, employment, local and state sales tax, property taxes, population, and other variables unique to a specific region. To the greatest extent possible, the Project Team will seek to quantify all of the identifiable economic, demographic, and social impacts. However, some social impacts, such as the cultural impact to a community due to the development

of a reservoir for water supply, may not be quantifiable. In this case and where possible, qualitative data will be utilized to identify and measure the impact.

2.3.3 Analysis of Impacts - Once the impacts from the proposed water supply have been identified, utilize computer software to calculate the projected economic effect of each impact. The Project Team will likely utilize the IMPLAN software package in quantifying the economic impact. The IMPLAN software applies Input-Output Analysis as a means of examining relationships within an economy. This software captures monetary market transactions for consumption in a given time period using actual data from local economies. Using both descriptive and predictive modeling, team members will calculate the multipliers applicable to each impact. A multiplier, named for the multiplicative effect that takes place in an economy following some initial stimulus, are used to determine the economic effect of an impact. Utilizing the multiplier enables the calculation of the direct, indirect, and induced benefits or costs of an activity, resulting in the quantification of the identified impact.

2.3.4 Calculation of the Net Economic Impact - Once each impact has been identified, calculate the net economic impact of the water supply alternative. In performing this task, consider positive and negative impacts to the Basin of Origin and determine the total net economic impact.

2.4 - Draft Report

2.4.1 **Deliverable 2.4A:** Develop a draft report and deliver report to the Study Commission, along with all associated tables, schedules, and/or data files. The draft report will detail the results of the literature review and the results of the identification and evaluation of the socioeconomic and demographic impacts to each water supply's Basin of Origin. Finally, the draft report will provide any recommendations for further analyses, including a draft scope of work, as deemed necessary by the Project Team.

2.4.2 Study Commission QA/QC. (Project Team will assist Commission)

2.5 – Finalize Draft Task Report

Deliverable 2.4B: Make appropriate changes and provide the Study Commission with the Final Report. After completion of the Final Report, make a public presentation of the final report results, if requested by the Study Commission.

Task 3. Water Conservation and Reuse Strategies

SB3 Section 4.04 (e)(3): "determine whether water demand in the Region C Regional Water Planning Area may be reduced through additional conservation and reuse measures so as to postpone the need for additional water supplies;"

The purpose of this task is to:

- review the water conservation and reuse strategies of "water user groups" included in the 2006 Region C Water Plan,
- reevaluate potentially feasible water conservation and reuse strategies included in the 2006 Region C Water Plan,
- determine new potentially feasible water conservation and reuse strategies for Region C,
- evaluate opinion of probable costs and potential water savings for potentially feasible water conservation and reuse strategies for Region C,
- evaluate drought management strategies for Region C and their applicability to reducing water demand projections,
- provide recommendations for future conservation, reuse, and drought management projects within Region C.

Work will include the following:

SubTask 3.1 - Review the 2006 Region C Regional Water Plan's water conservation and reuse strategies for each water user group.

3.1.1 Review water demand projection bases, methodologies, and estimates in the 2006 Plan.

3.1.2 Review water conservation and reuse strategies in 2006 Plan for each of the following water user groups:

a. water user groups (about 360) with identified water supply needs that include water conservation or reuse strategies;

b. water user groups (about 20) with identified water supply needs that did not include water conservation or reuse strategies;

c. water user groups (about 45) who do not have an identified water supply need but did include conservation or reuse strategies.

3.1.3 Prepare tabulation and summary of specific strategies, methodologies, and assumptions utilized for including or omitting water conservation and reuse strategies in the in 2006 Plan for 425 user groups.

SubTask 3.2 - Identify state-of-the-art best management practices for water conservation, reuse, and drought management practices in Region C

3.2.1 Develop a list of potential state-of-the-art water conservation best management practices for Region C.

3.2.2 Develop a list of potential state-of-the-art water reuse best management practices for Region C.

3.2.3 Develop a list of potential state-of-the-art drought management best management practices for Region C.

SubTask 3.3 - Evaluate water conservation and reuse practices for Region C

3.3.1 Evaluate water conservation strategies identified in the 2006 Plan identified as "potentially feasible".

3.3.2 Determine the data needs for conservation strategies deemed infeasible in the 2006 Plan due to lack of data.

3.3.3 Evaluate new potentially feasible water conservation strategies for Region C.

3.3.4 Develop estimates of potential water savings for potentially feasible water conservation strategies for Region C.

3.3.5 Develop opinion of probable costs for potentially feasible water conservation strategies for Region C.

3.3.6 Evaluate water reuse strategies identified in the 2006 Plan identified as "potentially feasible".

3.3.7 Determine the data needs for reuse strategies deemed infeasible in the 2006 Plan due to lack of data.

3.3.8 Evaluate new potentially feasible water reuse strategies for Region C.

3.3.9 Develop estimates of reduced water demand projections for potentially feasible water reuse strategies for Region C.

3.3.10 Develop opinion of probable costs for potentially feasible water conservation strategies for Region C.

3.3.11 Evaluate drought management strategies and their applicability to reducing water demand projections for Region C.

SubTask 3.4 - Evaluate water user group responses to the 2009 survey.

3.4.1 Evaluate reported utility water conservation strategies in comparison with best management practices.

3.4.2 Evaluate cost effectiveness of water conservation best management practices for Region C utilities.

3.4.3 Evaluate reported utility water reuse strategies in comparison with best management practices.

3.4.4 Evaluate the cost effectiveness of water reuse best management practices for Region C utilities.

3.4.5 Evaluate reported utility drought management strategies in comparison with best management practices.

3.4.6 Evaluate cost effectiveness of drought management best practices for Region C utilities.

SubTask 3.5 - Prepare findings on water conservation, water reuse, and drought management strategies in Region C.

3.5.1 Prepare documentation of study methodology and results obtained from each of the water user groups.

3.5.2 Prepare recommendations on definitive tasks.

SubTask 3.6 – Prepare Final Report

Deliverable 3.6: At the completion of this SubTask, provide a report containing the process used in the study and the results obtained from each of the water user groups requested to respond to the survey. To the extent possible the report will avoid creating a series of executive summaries and literature reviews that already exist within the Region C 2006 Water Plan that do not offer substantive information to allow the Study Commission on Region C Water Supply to move forward with definitive tasks.

3.6.1 Assemble and deliver the final report.

SubTask 3.7 - Project Management

3.7.1 Participate in up to 12 meetings and workshops.

3.7.2 Monitor progress and prepare status reports.

3.7.3 Prepare monthly invoices.

3.7.4 Coordinate with other study consultants.

Task 4. Securing a definitive policy statement from the United States Army Corps of Engineers (USCOE)

It is understood that the USCOE will provide a written policy statement on mitigation requirements for each reservoir included in the Region C Water Plan. No work will be performed under this task by the contractor.

Task 5. Determination of mitigation burden to be shared by the Region C and D Regional Water Planning Areas

Concurrently with Task 4, it is understood that the USCOE will issue a statement relating to whether the mitigation burden may be shared.

SubTask 5.1 – Coordination

EC wll participate and coordinate in meetings to determine from the USCOE, to the extent possible, the feasibility of sharing of the aforementioned mitigation burdens between Regions C and D.

SubTask 5.2 – Data Development

Acquire data and/or information necessary to assess criteria and performance standards for three types of wetlands mitigation options: (1) mitigation banks, (2) in-lieu programs, and (3) permittee responsible compensatory mitigation as described in the "Final Compensatory Mitigation Rule" as issued by the EPA and USCOE, for sites suitable for mitigation within Region C and Region D.

SubTask 5.3 – GIS Application & Development

If the USCOE is unable to identify sites suitable for Region D or Region C, EC will develop a GIS application to assist in site selection, and produce maps of these mitigation sites overlain to aerial photography, for both Regions D and C.

SubTask 5.4 – Prepare Final Task Report

Deliverable 5.4: EC will summarize in a brief report the work performed in this SubTask following the standards and criteria listed in SubTask 5.1, and including the maps developed in SubTask 5.3, as necessary.

Task 6. Determining Innovative Methods of Compensation to Affected Property Owners

Based upon the requirements of SB 3, the Study Commission is tasked with identifying and reviewing innovative methods of compensation to property owners affected by existing or potential water supplies, or the transfer of existing or potential water supplies to Region C. Such methods which should be reviewed include, but are not limited to, royalties for water stored on acquired properties and annual payments to landowners for properties acquired for the construction of future reservoirs.

Work will include the following:

SubTask 6.1 - Literature Search

Conduct a two-stage literature review and search. In the first stage, focus efforts on identifying public works projects both in the State of Texas and in the nation as a whole where innovative and creative methods have been used to compensate property owners affected by the development of water supply alternatives. In conducting this search, utilize all means available including, but not limited to, Industry Organizations and Publications, Electronic Databases, Academic Resources and the Internet.

The second stage of the literature review and search will focus on public works projects both in the State of Texas and in the Nation where innovative and creative methods of compensation have been used, in general. An example of such a project might include the engagement conducted by members of the Project Team in which the City of Waco, as a wholesale water provider, in lieu of accepting compensation through a contractual raw water reservation fee, accepted easements and facilities to compensate for raw water service.

SubTask 6.2 - Expert Interviews

Prior to completing the literature search, request from the Study Commission a list of water industry experts and professionals which the Study Commission believes may have knowledge of innovative and creative compensation methods from non-profit government entities, available under current state law, which might be utilized in the development of Region C water supplies. Expert interviews will be conducted in-person or via teleconference where in-person interviews would be cost prohibitive. To supplement the list of experts and professionals developed by the Study Commission, the Project Team, based upon its members' professional experience and industry insight, will also recommend a list of experts and professionals that the Study Commission may wish to consult. The names of these individuals will be provided to the Study Commission for their review and approval for inclusion in Work Task 3.

SubTask 6.3 - Summarize Literature Search and Expert Interviews

Deliverable 6.3: Upon completion of the literature search and expert interviews, the Project Team will summarize the results of these work tasks in a draft report to the Study Commission. This summary will include a brief description of each public works project identified in which compensation was required, a brief description of the type of innovative or creative compensation, the Project Team's perceived strengths and/or weaknesses of the compensation method, the tax impact of the compensation method to the property owner, if any, and, finally, the applicability of the compensation method to the development of water supplies for Region C. With regards to the expert interviews, the Project Team will compile the list of comments, suggestions, and ideas garnered from the interviews into the Draft Report.

Finally, the Project Team will develop a weighted ranking scale for the compensation methods identified. This ranking will clearly identify the attributes scored for each compensation method and the relative weight assigned to that attribute and the reasons

for such weighting. Values will then be assigned by the Project Team to each attribute and the compensation methods ranked based upon total score.

SubTask 6.4 – Study Commission QA/QC

SubTask 6.5 - Compensation Workshop

Upon completion of the Draft Report, provide said report to the Study Commission. Within two weeks of delivering the draft report, schedule a compensation workshop with the Study Commission and/or its designees. The goal of this workshop will be three-fold:

Present the results of the draft report and answer questions and receive comments about study efforts;

Generate discussion regarding the compensation methods identified, the strengths and/or weaknesses of each method, the tax impact of the compensation method to the property owner, if any, and the applicability of the method to the development of Region C water supplies; and

Generate discussion among workshop participants regarding the weighted ranking scale developed by the study, and the resulting ranking of the compensation methods as it applies to the development of Region C Water Supplies

To conclude the workshop, facilitate an open forum discussion which will seek to generate any additional ideas regarding innovative or creative compensation methods which may not have been identified during the completion of the study's work tasks.

SubTask 6.6 – Finalize Draft Task Report

Upon completion of the Compensation Workshop, summarize the workshop results and incorporate said results into a Final Report. It is anticipated that the Final Report will be provided to the Study Commission within fifteen (15) working days of the workshop's completion. Upon request of the Study Commission, the Project Team will be available to publicly present the results of Task 6 should the Study Commission request such a presentation.

Task 7. Evaluate the minimum number of surface acres impacted by the construction of the proposed new reservoirs

Subsequent to a review of the 2006 Water Plan data and supporting information, a GIS-based approach will be utilized, integrating the most current and cost-effective aerial imagery to evaluate: A) the potential for cost effectiveness, B) acquisition issues involving eminent domain, and C) the minimum number of surface acres impacted by the construction of Marvin Nichols Reservoir. Location and appropriate operating elevations of Marvin Nichols Reservoir will reflect the data and information from the 2006 Region C Water Plan.

Work will include the following:

SubTask 7.1 – Review Methodologies and Estimates

EC will assess estimations of potential volume related to such factors as existing topographical data. This includes the identification and summary of the existing methodologies and estimates of the surface acres impacted by the proposed reservoir. In consultation with the Commission, it will be determined if an additional volume analysis should be employed. Based on best professional judgment, a recommendation on the minimum number of surface acres impacted based on the existing data and methodologies will be made, or a recommendation will be made to develop alternative methodologies for estimating the minimum number of surface acres required for the construction of proposed reservoirs in order to develop adequate water supply;

SubTask 7.2 – Data Acquisition

In the event that alternative methodologies are desired by the Commission, it is possible that recommendations could be made to obtain higher accuracy LIDAR topographic data for the sites. EC will coordinate the procurement of LIDAR data.

SubTask 7.3 – GIS Application & Development

Based upon the recommendations SubTask 7.1, EC will employ GIS and data developed in SubTask 7.2 to estimate potential volume of the proposed reservoir.

SubTask 7.4 – Prepare Final Report

At the completion of this SubTask, provide a report containing the methods utilized in the analyses and the results obtained.

Task 8. Identify the locations of proposed reservoir sites and proposed mitigation sites

The purpose of this task is to identify the location of proposed reservoir site for Marvin Nichols Reservoir and proposed mitigation sites, as applicable, as selected in accordance with existing state and federal law, in the Region C and D Regional Water Planning Areas using satellite imagery with sufficient resolution to permit land ownership to be determined.

Work will include the following:

SubTask 8.1: Land Ownership Determination

Determine if land ownership records exist in a digitized form appropriate for inclusion into satellite imagery. This shall be done for each County affected by reservoir construction. Determine the cost and time required to convert existing records to an appropriate digital format for each County, if necessary. Determine the cost and time

required to produce a land ownership map from existing County Deed Records for each reservoir project.

Deliverable 8.1: Report the results and findings of determinations required in a brief technical memorandum to the Study Commission.

SubTask 8.2 - Satellite Imagery

Determine if satellite imagery exists and is available in the appropriate digital format for the Marvin Nichols proposed reservoir site. Determine if satellite imagery exists and is available in appropriate digital format for possible mitigation sites as determined under Task 4 SB 3 Section 4.04 (e)(4). If satellite imagery does not exist, determine cost and time to acquire needed imagery.

Deliverable 8.2: Report the results and findings of determinations required in SubTask 8.2 in a brief technical memorandum to the Study Commission.

SubTask 8.3 - Consideration by Study Commission of information provided from completion of SubTask 8.1 and SubTask 8.2.

- If compatible land ownership data and satellite imagery exist or can be generated, consideration will be given by the Study Commission to complete this SubTask as required.
- If compatible land ownership records do not exist, consideration will be given to producing a land ownership map from existing County Deed Records that can be overlain onto satellite imagery.
- Given excessive cost or time constraints, the Study Commission may give consideration to redirect efforts to comply with SB3 Section 4.04 (e)(8).

SubTask 8.4 - Merge data onto satellite imagery if directed by Study Commission.

Prepare both electronic and printed version of mapping to appropriate scale and size to identify the locations of the proposed Marvin Nichols reservoir site, proposed mitigation sites, and land ownership for the proposed Marvin Nichols reservoir. Provide one copy of electronic and one copy of printed version of mapping to each member of the Study Commission.

Deliverable 8.4: Satellite imagery with the proposed reservoir site, proposed mitigation sites, and land ownershipfor the proposed Marvin Nichols reservoir project.

Task 9. Administrative Expense

Administrative expense includes such things as reimbursement of Commission Members travel cost, cost to publish legal notices, postage, and copy expense.

Phase IIB

Work performed under Phase III will focus upon a comprehensive analysis and review of alternative studies related to the development of projects inclusive of the five reservoirs studied under Phase I of this project.

Task 1. Water Supply Alternatives

Work will include the following:

SubTask 1.1 - Literature Review

1.1.1. Perform literature review via comprehensive analysis of reports and documents related to the stated subject matter and published or located (but not limited to) the following sources:

- State of Texas agencies including TPWD, TCEQ, TWDB or predecessor agencies;
- Federal agency reports including those produced by U.S. Geological Survey (USGS), U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, and U.S. Army Corps of Engineers;
- River Authority and Water Districts
- University studies
- Journal articles referenced in the following online databases:
- Applied Science and Technology Abstracts,
- Water Resource Abstracts.

Where possible, effort will be made to obtain all studies that have considered, evaluated, or proposed water supply alternatives for the Region C Planning Area, and will cover studies back to 1985. The project team will coordinate with the Study Commission to determine at what level the point of diminishing returns is located in order to manage expectations, and due diligence will be made to obtain all studies, including those not necessarily utilized in the state's Regional Water Planning Process.

1.1.2. **Deliverable 1.1A:** A comprehensive list will be compiled detailing each study, including a synopsis of each study, title, date of study, sponsor, author, type (technical vs. planning), subject (specific facility vs. water user water plan), and relevant information to the focus of this project.

1.1.3 **Deliverable 1.1B:** Compile a draft list of water supply alternatives for evaluation to be submitted to the Study Commission for review and comment.

1.1.4 Study Commission QA/QC. (Task Performed by Commission)

1.1.5 **Deliverable 1.1C:** Incorporate the Commission's suggested modifications to create a final list of water supply alternatives for submission.

1.1.6 **Deliverable 1.1D:** A brief SubTask report summarizing the results of this work element, including the report synopses and bibliography, will be submitted in a .pdf format. A presentation will also be made of the findings at the time of submittal, if requested by the Study Commission.

SubTask 1.2 - Summarization of Water Supply Alternatives

The information compiled from the previous work element will be investigated with respect to individual water supply alternatives. Each of the studies from the previous task, as well as the water supply alternatives identified in the 2001 and 2006 Region C Water Plans, will be mined for information on water supply alternatives and that information aggregated *by water supply alternative*.

1.2.1 For each water supply alternative, a brief written summary will be provided. A compilation of *each* study's components attributing to the water supply alternatives will be developed and cross-referenced including the following components:

a. name of water supply alternative;
b. category/type of water supply alternative (e.g. reuse vs. groundwater);
c. water supply volume (e.g. firm yield) as calculated in accordance with TWDB's technical guidance in the regional water planning contracts (i.e. Exhibit B) which requires that firm yield be calculated under drought of record conditions;
d. detailed cost of water supply alternative as standardized by TWDB's technical guidance in the regional water planning contracts;
e. number and name(s) of entities who would develop the water supply alternative and number and name(s) of entities who would be supplied by the water supply alternative;
f. cross-reference for each version of each water supply alternative (e.g. title of study, year, and page number);
g. level of detail of study of the water supply alternative (e.g. planning level versus engineering level);
h. type of study (specific facility vs. water user water plan);
i. date of study;
j. study sponsor(s);
k. study author(s);
l. identification of whether the water supply alternative was a recommended water management strategy in the 2001 or 2006 Region C Water Plans;
m. conditions and terms for viability of the water supply alternative;
n. other attributes considered relevant to this Subtask as identified by the Study Commission or Contractor;
o. water quality of source;

p. permitting requirements;
q. environmental impact;
r. operational considerations (e.g., flood control, system operation, etc.); and
s. economic impact to both Regions C and D (e.g., gain/loss of jobs, industry, manufacturing, etc.).

Significant variations between attributes for different versions of the same water supply alternative will be characterized and clarified. Appropriate cross-references to the source plans or studies will be made for each water supply alternative.

1.2.2 **Deliverable 1.2:** A brief SubTask report and data files summarizing the results of this work element will be submitted in a PDF format. A presentation will also be made of the findings at the time of submittal, if requested by the Study Commission.

SubTask 1.3 - Data Gap Analysis

Assess results of previous work elements for potential gaps in information with respect to what additional studies might be undertaken to bridge those gaps.

1.3.1 Contact all of the major water providers in Region C to determine the availability of relevant studies.

1.3.2 Identify potential gaps in existing water supply plans and studies.

1.3.3 **Deliverable 1.3A:** Based on best professional judgment and coordination at the agency staff level, a preliminary set of recommendations for studies to bridge data gaps will be presented. A preliminary ranking will be performed to assess the analysis to be prosecuted in Task 2.

1.3.4 Study Commission QA/QC. (Task Performed by Commission)

1.3.5 **Deliverable 1.3B:** Incorporate comments from the Study Commission to develop draft scopes of work for additional studies and a ranking for Phase 2, Task 2 of this analysis. Prepare a brief report and data files summarizing the results of this work element will be submitted in a PDF format. A presentation will also be made of the findings at the time of submittal, if requested by the Study Commission.

Task 2. Project approach: Socioeconomic Impacts

SB 3 requires an analysis of the socioeconomic impact on areas in which water supply used to meet the water needs of Region C would potentially be located. These areas are herein referred to as the "Basin of Origin." Specifically, this impact determination should consider the effects on landowners, agricultural and natural resources, businesses, industries, and taxing entities. Further, SB 3 also requires the determination of the

socioeconomic impact on the Basin of Origin of utilizing water from Wright Patman Lake to meet future water needs in Region C. Specifically, this impact will examine potential changes in water availability from the reservoir and the impact this may have on cities, business, and industries that rely on the reservoir for water supplies.

Work will include the following:

2.1 - Kick-off Meeting

To initiate Task 2 of the Project, Project Team Members propose to meet with the Study Commission and/or its designees to finalize the specific Scope of Services to complete Task 2 and to clarify and finalize the Study Commission's Goals and Objectives for the Task. During this meeting, the Project Team will request from the Study Commission the list of agencies or organizations the Project Team should approach to secure any additional reports or studies that are responsive to SB 3 requirements.

2.2 - Literature Review

2.2.1 Conduct a literature review of reports and/or analysis identified by the Study Commission and other reports and/or analyses which may be readily available related to the determination of the socioeconomic impact of the development and/or use of water supplies to the supply's Basin of Origin. Examine each report and/or analysis and prepare a memorandum which discusses the methodology employed and provides the Project Team's perceived strengths and/or weakness of said methodology and results. Further, the Project Team will also identify any gaps within the reports and/or analyses and provide recommendations on how to bridge such gaps to the Study Commission. This examination will include, but not be limited to, the studies identified within the Draft List of Citations for Studies Related to Task 2 as identified within the Request for SOQs.

2.2.2 **Deliverable 2.2A:** Once completed, draft memorandum will be submitted to the Study Commission for review and comment.

2.2.3 Study Commission QA/QC. Upon review, the Project Team will request further guidance from the Study Commission on the methodology and/or techniques to be employed in determining the socioeconomic impacts related to Region C Water Supply Alternatives. *(Task Performed by Commission)*

2.2.4 **Deliverable 2.2B:** Submit Final Methodology Memorandum.

SubTask 2.3 - Identification and Evaluation of Socioeconomic and Demographic Impacts

After receiving further guidance and comments from the Study Commission, the Project Team will utilize the approved methodology and/or techniques to identify and evaluate the socioeconomic and demographic impacts to different economic sectors in areas where water supply alternatives would be or are located.

2.3.1 Identification of Impact Areas - Determine the areas of the State, down to the County level, that will be impacted by each water supply alternative (i.e., Basin of Origin).

2.3.2 Identification of Impacts - Once the impacted area has been identified, determine the types of short-term and long-term, positive and negative impacts that each area may experience, and the economic sectors that may be impacted. Economic sectors examined will include, but not be limited to, landowners, agricultural and natural resources, commercial business, industrial facilities, and taxing entities. Impacts measured will include, but not be limited to direct and secondary losses and/or gains in regional output, regional value-added, employment, local and state sales tax, property taxes, population, and other variables unique to a specific region. To the greatest extent possible, the Project Team will seek to quantify all of the identifiable economic, demographic, and social impacts. However, some social impacts, such as the cultural impact to a community due to the development of a reservoir for water supply, may not be quantifiable. In this case and where possible, qualitative data will be utilized to identify and measure the impact.

2.3.3 Analysis of Impacts - Once the impacts from the proposed water supply have been identified, utilize computer software to calculate the projected economic effect of each impact. The Project Team will likely utilize the IMPLAN software package in quantifying the economic impact. The IMPLAN software applies Input-Output Analysis as a means of examining relationships within an economy. This software captures monetary market transactions for consumption in a given time period using actual data from local economies. Using both descriptive and predictive modeling, team members will calculate the multipliers applicable to each impact. A multiplier, named for the multiplicative effect that takes place in an economy following some initial stimulus, are used to determine the economic effect of an impact. Utilizing the multiplier enables the calculation of the direct, indirect, and induced benefits or costs of an activity, resulting in the quantification of the identified impact.

2.3.4 Calculation of the Net Economic Impact - Once each impact has been identified, calculate the net economic impact of the water supply alternative. In performing this task, consider positive and negative impacts to the Basin of Origin and determine the total net economic impact.

2.4 - Draft Report

2.4.1 **Deliverable 2.4A:** Develop a draft report and deliver report to the Study Commission, along with all associated tables, schedules, and/or data files. The draft report will detail the results of the literature review and the results of the identification and evaluation of the socioeconomic and demographic impacts to each water supply's Basin of Origin. Finally, the draft report will provide any recommendations for further analyses, including a draft scope of work, as deemed necessary by the Project Team.

2.4.2 Study Commission QA/QC. (Project Team will assist Commission)

2.5 – Finalize Draft Task Report

Deliverable 2.4B: Make appropriate changes and provide the Study Commission with the Final Report. After completion of the Final Report, make a public presentation of the final report results, if requested by the Study Commission.

Task 3. Water Conservation and Reuse Strategies

SB3 Section 4.04 (e)(3): "determine whether water demand in the Region C Regional Water Planning Area may be reduced through additional conservation and reuse measures so as to postpone the need for additional water supplies;"

The purpose of this task is to:

- review the water conservation and reuse strategies of "water user groups" included in the 2006 Region C Water Plan,
- reevaluate potentially feasible water conservation and reuse strategies included in the 2006 Region C Water Plan,
- determine new potentially feasible water conservation and reuse strategies for Region C,
- evaluate opinion of probable costs and potential water savings for potentially feasible water conservation and reuse strategies for Region C,
- evaluate drought management strategies for Region C and their applicability to reducing water demand projections,
- provide recommendations for future conservation, reuse, and drought management projects within Region C.

Work will include the following:

SubTask 3.1 - Review the 2006 Region C Regional Water Plan's water conservation and reuse strategies for each water user group.

3.1.1 Review water demand projection bases, methodologies, and estimates in the 2006 Plan.

3.1.2 Review water conservation and reuse strategies in 2006 Plan for each of the following water user groups:

a. water user groups (about 360) with identified water supply needs that include water conservation or reuse strategies;

b. water user groups (about 20) with identified water supply needs that did not include water conservation or reuse strategies;

c. water user groups (about 45) who do not have an identified water supply need but did include conservation or reuse strategies.

3.1.3 Prepare tabulation and summary of specific strategies, methodologies, and assumptions utilized for including or omitting water conservation and reuse strategies in the in 2006 Plan for 425 user groups.

SubTask 3.2 - Identify state-of-the-art best management practices for water conservation, reuse, and drought management practices in Region C

3.2.1 Develop a list of potential state-of-the-art water conservation best management practices for Region C.

3.2.2 Develop a list of potential state-of-the-art water reuse best management practices for Region C.

3.2.3 Develop a list of potential state-of-the-art drought management best management practices for Region C.

SubTask 3.3 - Evaluate water conservation and reuse practices for Region C

3.3.1 Evaluate water conservation strategies identified in the 2006 Plan identified as "potentially feasible".

3.3.2 Determine the data needs for conservation strategies deemed infeasible in the 2006 Plan due to lack of data.

3.3.3 Evaluate new potentially feasible water conservation strategies for Region C.

3.3.4 Develop estimates of potential water savings for potentially feasible water conservation strategies for Region C.

3.3.5 Develop opinion of probable costs for potentially feasible water conservation strategies for Region C.

3.3.6 Evaluate water reuse strategies identified in the 2006 Plan identified as "potentially feasible".

3.3.7 Determine the data needs for reuse strategies deemed infeasible in the 2006 Plan due to lack of data.

3.3.8 Evaluate new potentially feasible water reuse strategies for Region C.

3.3.9 Develop estimates of reduced water demand projections for potentially feasible water reuse strategies for Region C.

3.3.10 Develop opinion of probable costs for potentially feasible water conservation strategies for Region C.

3.3.11 Evaluate drought management strategies and their applicability to reducing water demand projections for Region C.

SubTask 3.4 - Evaluate water user group responses to the 2009 survey.

3.4.1 Evaluate reported utility water conservation strategies in comparison with best management practices.

3.4.2 Evaluate cost effectiveness of water conservation best management practices for Region C utilities.

3.4.3 Evaluate reported utility water reuse strategies in comparison with best management practices.

3.4.4 Evaluate the cost effectiveness of water reuse best management practices for Region C utilities.

3.4.5 Evaluate reported utility drought management strategies in comparison with best management practices.

3.4.6 Evaluate cost effectiveness of drought management best practices for Region C utilities.

SubTask 3.5 - Prepare findings on water conservation, water reuse, and drought management strategies in Region C.

3.5.1 Prepare documentation of study methodology and results obtained from each of the water user groups.

3.5.2 Prepare recommendations on definitive tasks.

SubTask 3.6 – Prepare Final Report

Deliverable 3.6: At the completion of this SubTask, provide a report containing the process used in the study and the results obtained from each of the water user groups requested to respond to the survey. To the extent possible the report will avoid creating a series of executive summaries and literature reviews that already exist within the Region C 2006 Water Plan that do not offer substantive information to allow the Study Commission on Region C Water Supply to move forward with definitive tasks.

3.6.1 Assemble and deliver the final report.

SubTask 3.7 - Project Management

3.7.1 Participate in up to 12 meetings and workshops.

3.7.2 Monitor progress and prepare status reports.

3.7.3 Prepare monthly invoices.

3.7.4 Coordinate with other study consultants.

Task 4. Securing a definitive policy statement from the United States Army Corps of Engineers (USCOE)

It is understood that the USCOE will provide a written policy statement on mitigation requirements for each reservoir included in the Region C Water Plan. No work will be performed under this task by the contractor.

Task 5. Determination of mitigation burden to be shared by the Region C and D Regional Water Planning Areas

Concurrently with Task 4, it is understood that the USCOE will issue a statement relating to whether the mitigation burden may be shared.

SubTask 5.1 – Coordination

EC wll participate and coordinate in meetings to determine from the USCOE, to the extent possible, the feasibility of sharing of the aforementioned mitigation burdens between Regions C and D.

SubTask 5.2 – Data Development

Acquire data and/or information necessary to assess criteria and performance standards for three types of wetlands mitigation options: (1) mitigation banks, (2) in-lieu programs, and (3) permittee responsible compensatory mitigation as described in the "Final Compensatory Mitigation Rule" as issued by the EPA and USCOE, for sites suitable for mitigation within Region C and Region D.

SubTask 5.3 – GIS Application & Development

If the USCOE is unable to identify sites suitable for Region D or Region C, EC will develop a GIS application to assist in site selection, and produce maps of these mitigation sites overlain to aerial photography, for both Regions D and C.

SubTask 5.4 – Prepare Final Task Report

Deliverable 5.4: EC will summarize in a brief report the work performed in this SubTask following the standards and criteria listed in SubTask 5.1, and including the maps developed in SubTask 5.3, as necessary.

Task 6. Determining Innovative Methods of Compensation to Affected Property Owners

Based upon the requirements of SB 3, the Study Commission is tasked with identifying and reviewing innovative methods of compensation to property owners affected by existing or potential water supplies, or the transfer of existing or potential water supplies to Region C. Such methods which should be reviewed include, but are not limited to, royalties for water stored on acquired properties and annual payments to landowners for properties acquired for the construction of future reservoirs.

Work will include the following:

SubTask 6.1 - Literature Search

Conduct a two-stage literature review and search. In the first stage, focus efforts on identifying public works projects both in the State of Texas and in the nation as a whole where innovative and creative methods have been used to compensate property owners affected by the development of water supply alternatives. In conducting this search, utilize all means available including, but not limited to, Industry Organizations and Publications, Electronic Databases, Academic Resources and the Internet.

The second stage of the literature review and search will focus on public works projects both in the State of Texas and in the Nation where innovative and creative methods of compensation have been used, in general. An example of such a project might include the engagement conducted by members of the Project Team in which the City of Waco, as a wholesale water provider, in lieu of accepting compensation through a contractual raw water reservation fee, accepted easements and facilities to compensate for raw water service.

SubTask 6.2 - Expert Interviews

Prior to completing the literature search, request from the Study Commission a list of water industry experts and professionals which the Study Commission believes may have knowledge of innovative and creative compensation methods from non-profit government entities, available under current state law, which might be utilized in the development of Region C water supplies. Expert interviews will be conducted in-person or via teleconference where in-person interviews would be cost prohibitive. To supplement the list of experts and professionals developed by the Study Commission, the Project Team, based upon its members' professional experience and industry insight, will also recommend a list of experts and professionals that the Study Commission may wish to consult. The names of these individuals will be provided to the Study Commission for their review and approval for inclusion in Work Task 3.

SubTask 6.3 - Summarize Literature Search and Expert Interviews

Deliverable 6.3: Upon completion of the literature search and expert interviews, the Project Team will summarize the results of these work tasks in a draft report to the Study

Commission. This summary will include a brief description of each public works project identified in which compensation was required, a brief description of the type of innovative or creative compensation, the Project Team's perceived strengths and/or weaknesses of the compensation method, the tax impact of the compensation method to the property owner, if any, and, finally, the applicability of the compensation method to the development of water supplies for Region C. With regards to the expert interviews, the Project Team will compile the list of comments, suggestions, and ideas garnered from the interviews into the Draft Report.

Finally, the Project Team will develop a weighted ranking scale for the compensation methods identified. This ranking will clearly identify the attributes scored for each compensation method and the relative weight assigned to that attribute and the reasons for such weighting. Values will then be assigned by the Project Team to each attribute and the compensation methods ranked based upon total score.

SubTask 6.4 – Study Commission QA/QC

SubTask 6.5 - Compensation Workshop

Upon completion of the Draft Report, provide said report to the Study Commission. Within two weeks of delivering the draft report, schedule a compensation workshop with the Study Commission and/or its designees. The goal of this workshop will be three-fold:

Present the results of the draft report and answer questions and receive comments about study efforts;

Generate discussion regarding the compensation methods identified, the strengths and/or weaknesses of each method, the tax impact of the compensation method to the property owner, if any, and the applicability of the method to the development of Region C water supplies; and

Generate discussion among workshop participants regarding the weighted ranking scale developed by the study, and the resulting ranking of the compensation methods as it applies to the development of Region C Water Supplies

To conclude the workshop, facilitate an open forum discussion which will seek to generate any additional ideas regarding innovative or creative compensation methods which may not have been identified during the completion of the study's work tasks.

SubTask 6.6 – Finalize Draft Task Report

Upon completion of the Compensation Workshop, summarize the workshop results and incorporate said results into a Final Report. It is anticipated that the Final Report will be provided to the Study Commission within fifteen (15) working days of the workshop's completion. Upon request of the Study Commission, the Project Team will be available to publicly present the results of Task 6 should the Study Commission request such a presentation.

Task 7. Evaluate the minimum number of surface acres impacted by the construction of the proposed new reservoirs

Subsequent to a review of the 2006 Water Plan data and supporting information, a GIS-based approach will be utilized, integrating the most current and cost-effective aerial imagery to evaluate: A) the potential for cost effectiveness, B) acquisition issues involving eminent domain, and C) the minimum number of surface acres impacted by the construction of the proposed new reservoirs recommended in the 2006 Region C Water Plan (e.g. Lake Fastrill, Lake Ralph Hall, Lower Bois d'Arc Reservoir, and Marvin Nichols Reservoir). Location and appropriate operating elevations of each proposed reservoir will reflect the data from the 2006 Region C Water Plan.

Work will include the following:

SubTask 7.1 – Review Methodologies and Estimates

EC will assess estimations of potential volumes related to such factors as existing topographical data. This includes the identification and summary of the existing methodologies and estimates of the surface acres impacted by the proposed reservoirs identified in the literature search performed in SubTask 1.1 and the determination if better topographic data currently exists since the generation of original estimates. In consultation with the Commission, it will be determined if an additional volume analysis should be employed. Based on best professional judgment, a recommendation on the minimum number of surface acres impacted based on the existing data and methodologies will be made, or a recommendation will be made to develop alternative methodologies for estimating the minimum number of surface acres required for the construction of proposed reservoirs in order to develop adequate water supply;

SubTask 7.2 – Data Acquisition

In the event that alternative methodologies are desired by the Commission, it is possible that recommendations could be made to obtain higher accuracy LIDAR topographic data for the sites. EC will coordinate the procurement of LIDAR data.

SubTask 7.3 – GIS Application & Development

Based upon the recommendations SubTask 7.1, EC will employ GIS and data developed in SubTask 7.2 to estimate potential volumes of the proposed reservoirs.

SubTask 7.4 – Prepare Final Report

At the completion of this SubTask, provide a report containing the methods utilized in the analyses and the results obtained.

Task 8. Identify the locations of proposed reservoir sites and proposed mitigation sites

The purpose of this task is to identify the locations of proposed reservoir sites and proposed mitigation sites, as applicable, as selected in accordance with existing state and federal law, in the Region C and D Regional Water Planning Areas using satellite imagery with sufficient resolution to permit land ownership to be determined.

Work will include the following:

SubTask 8.1: Land Ownership Determination

Determine if land ownership records exist in a digitized form appropriate for inclusion into satellite imagery. This shall be done for each County affected by reservoir construction. Determine the cost and time required to convert existing records to an appropriate digital format for each County, if necessary. Determine the cost and time required to produce a land ownership map from existing County Deed Records for each reservoir project.

Deliverable 8.1: Report the results and findings of determinations required in a brief technical memorandum to the Study Commission.

SubTask 8.2 - Satellite Imagery

Determine if satellite imagery exists and is available in the appropriate digital format for each proposed reservoir site in the 2006 Region C Water Plan. Determine if satellite imagery exists and is available in appropriate digital format for possible mitigation sites for each reservoir as determined under Task 4 SB 3 Section 4.04 (e)(4). If satellite imagery does not exist, determine cost and time to acquire needed imagery.

Deliverable 8.2: Report the results and findings of determinations required in SubTask 8.2 in a brief technical memorandum to the Study Commission.

SubTask 8.3 - Consideration by Study Commission of information provided from completion of SubTask 8.1 and SubTask 8.2.

- If compatible land ownership data and satellite imagery exist or can be generated, consideration will be given by the Study Commission to complete this SubTask as required.
- If compatible land ownership records do not exist, consideration will be given to producing a land ownership map from existing County Deed Records that can be overlain onto satellite imagery.
- Given excessive cost or time constraints, the Study Commission may give consideration to redirect efforts to comply with SB3 Section 4.04 (e)(8).

SubTask 8.4 - Merge data onto satellite imagery if directed by Study Commission.

Prepare both electronic and printed version of mapping to appropriate scale and size to identify the locations of proposed reservoir sites, proposed mitigation sites, and land ownership for each proposed reservoir in 2006 Region C Water Plan. Provide one copy of electronic and one copy of printed version of mapping to each member of the Study Commission.

Deliverable 8.4: Satellite imagery with proposed reservoir sites, proposed mitigation sites, and land ownership for each proposed reservoir project in the 2006 Region C Water Plan.

Task 9. Administrative Expense

Administrative expense includes such things as reimbursement of Commission Members travel cost, cost to publish legal notices, postage, and copy expense.

EXHIBIT C

EXHIBIT C

TASK BUDGET

TASK	DESCRIPTION	Phase I	Phase IIA	Phase IIB	Total A + B	Total A + C
		A	B	C		
1	Water Supply Alternatives	$311,671	$101,400	$465,000	$413,071	$776,671
2	Socioeconomic Impact Analysis	$128,329	$86,959	$164,999	$215,288	$293,328
3	Water Conservation and Reuse Strategies		$495,708	$495,708	$495,708	$495,708
4	Securing Policy Statement from USACE		$0	$0	$0	$0
5	Determination of Mitigation Burden to be Shared		$74,858	$118,660	$74,858	$118,660
6	Determining Innovative Methods of Compensation		$97,431	$129,960	$97,431	$129,960
7	Evaluate Minimum Number of Surface Acres Impacted		$82,741	$247,100	$82,741	$247,100
8	Identify Locations of Proposed Reservoir Sites and Proposed Mitigation Sites		$95,526	$266,890	$95,526	$266,890
9	Administrative	$ 60,000			$60,000	$60,000
Total		$500,000	$1,034,623	$1,888,317	$1,534,623	$2,388,317

EXHIBIT D

EXHIBIT D

EXPENSE BUDGET

CATEGORY	Phase I	Phase IIA	Phase IIB	Admin	Total A + B + D	Total A + C + D
	A	B	C	D		
Salaries & Wages[1]	$71,260	$140,876	$267,363	$0	$212,136	$338,623
Fringe[2]	21,642	$42,784	$81,198	$0	$64,426	$102,840
Travel	$15,000	$30,000	$30,000	$8,382	$53,382	$53,382
Other Expenses[3]	$3,000	$6,000	$6,000	$51,618	$60,618	$60,618
Commission Member Travel[5]	$0	$0	$0	$0	$0	$0
Subcontract Services	$220,000	$599,281	$1,094,424	$0	$819,281	$1,314,424
Overhead[4]	$90,735	$179,377	$340,433	$0	$270,112	$431,168
Profit	$18,364	$36,304	$68,899	$0	$54,668	$87,263
TOTAL	$440,001	$1,034,622	$1,888,317	$60,000	$1,534,623	$2,388,318

[1] Salaries and Wages is defined as the cost of salaries of engineers, draftsmen, stenographers, surveymen, clerks, laborers, etc., for time directly chargeable to this contract.

[2] Fringe is defined as the cost of social security contributions, unemployment, excise, and payroll taxes, employment compensation insurance, retirement benefits, medical and insurance benefits, sick leave, vacation, and holiday pay applicable thereto.

[3] Other Expenses is defined to include expendable supplies, communications, reproduction, postage, and costs of publishing legal notices.

[4] Overhead is defined as the costs incurred in maintaining a place of business and performing professional services similar to those specified in this contract. These costs shall include the following:

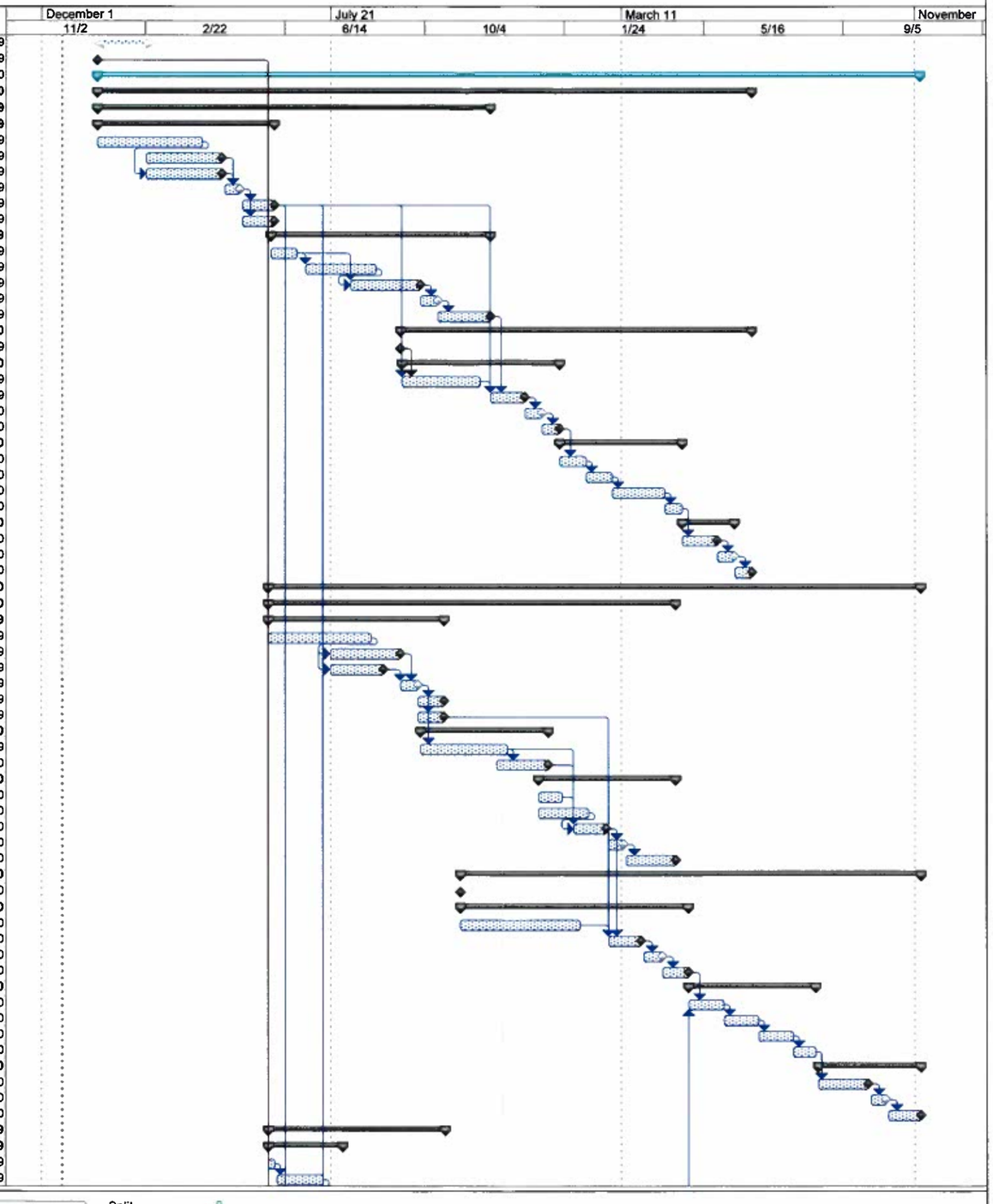
- Indirect salaries, including that portion of the salary of principals and executives that is allocable to general supervision;
- Indirect salary fringe benefits;
- Accounting and legal services related to normal management and business operations;
- Travel costs incurred in the normal course of overall administration of the business;
- Equipment rental;
- Depreciation of furniture, fixtures, equipment, and vehicles;
- Dues, subscriptions, and fees associated with trade, business, technical, and professional organizations;
- Other insurance;
- Rent and utilities; and
- Repairs and maintenance of furniture, fixtures,

[5] Commission Member Travel Expenses is defined as eligible travel expenses incurred by Study Commission members that cannot be reimbursed by any other entity, political subdivision, etc.

EXHIBIT E

Preliminary Region C Water Supply Study Schedule

ID	Task Name	Duration	Start	Finish
1	**0.0 - Exhibit E**	**36 days?**	**Mon 1/12/09**	**Mon 3/2/09**
2	**0.1 - Kickoff**	**1 day?**	**Thu 1/15/09**	**Thu 1/15/09**
3	**Region C Water Supply Study**	**472 days**	**Thu 1/15/09**	**Fri 11/5/10**
4	**PHASE I**	**375 days**	**Thu 1/15/09**	**Wed 6/23/10**
5	**1.0 - Water Supply Analyses**	**225 days**	**Thu 1/15/09**	**Wed 11/25/09**
6	**1.1 - Literature Review & Water Supply Alternative List**	**102 days**	**Thu 1/15/09**	**Fri 6/5/09**
7	1.1.1 - Perform Literature Review	60 days	Thu 1/15/09	Wed 4/8/09
8	1.1.2 - Prepare Comprehensive Study List	45 days	Mon 2/23/09	Fri 4/24/09
9	1.1.3 - Prepare Draft List of Water Supply Alternatives	45 days	Mon 2/23/09	Fri 4/24/09
10	1.1.4 - Study Commission QA/QC	10 days	Mon 4/27/09	Fri 5/8/09
11	1.1.5 - Prepare Final List of Water Supply Alternatives	20 days	Mon 5/11/09	Fri 6/5/09
12	1.1.6 - Prepare Brief Summary Task Report	20 days	Mon 5/11/09	Fri 6/5/09
13	**1.3 - Data Gap Analysis**	**126 days**	**Wed 6/3/09**	**Wed 11/25/09**
14	1.3.1 - Contact all major water providers	15 days	Wed 6/3/09	Tue 6/23/09
15	1.3.2 - Data gap assessment	40 days	Wed 7/1/09	Tue 8/25/09
16	1.3.3 - Prepare Draft List of Additional Studies	40 days	Thu 8/6/09	Wed 9/30/09
17	1.3.4 - Study Commission QA/QC	10 days	Thu 10/1/09	Wed 10/14/09
18	1.3.5 - Prepare Final List of Additional Studies	30 days	Thu 10/15/09	Wed 11/25/09
19	**2 - Socioeconomic Impacts**	**202 days**	**Tue 9/15/09**	**Wed 6/23/10**
20	**2.1 - Kickoff Meeting**	1 day	Tue 9/15/09	Tue 9/15/09
21	**2.2 - Literature Review**	**91 days**	**Wed 9/16/09**	**Wed 1/20/10**
22	2.2.1 - Conduct Literature Review	45 days	Wed 9/16/09	Tue 11/17/09
23	2.2.2 - Prepare Draft Methodology Memorandum	20 days	Thu 11/26/09	Wed 12/23/09
24	2.2.3 - Study Commission QA/QC	10 days	Thu 12/24/09	Wed 1/6/10
25	2.2.4 - Prepare Final Methodology Memorandum	10 days	Thu 1/7/10	Wed 1/20/10
26	**2.3 - Identification & Evaluation of Socioeconomic & Demographic Impacts**	**70 days**	**Thu 1/21/10**	**Wed 4/28/10**
27	2.3.1 - Identification of Impact Areas	15 days	Thu 1/21/10	Wed 2/10/10
28	2.3.2 - Identification of Impacts	15 days	Thu 2/11/10	Wed 3/3/10
29	2.3.3 - Analysis of Impacts	30 days	Thu 3/4/10	Wed 4/14/10
30	2.3.4 - Calculation of the Net Economic Impacts	10 days	Thu 4/15/10	Wed 4/28/10
31	**2.4 - Prepare Draft Task Report**	**30 days**	**Thu 4/29/10**	**Wed 6/9/10**
32	2.4.1 - Prepare Draft Task Report	20 days	Thu 4/29/10	Wed 5/26/10
33	2.4.2 - Study Commission QA/QC	10 days	Thu 5/27/10	Wed 6/9/10
34	**2.5 - Prepare Final Task Report**	10 days	Thu 6/10/10	Wed 6/23/10
35	**PHASE IIA or IIB**	**375 days**	**Mon 6/1/09**	**Fri 11/5/10**
36	**1.0 Water Supply Analyses**	**235 days**	**Mon 6/1/09**	**Fri 4/23/10**
37	**1.1 - Literature Review & Water Supply Alternative List**	**101 days**	**Mon 6/1/09**	**Mon 10/19/09**
38	1.1.1 - Perform Literature Review	60 days	Mon 6/1/09	Fri 8/21/09
39	1.1.2 - Prepare Comprehensive Study List	40 days	Tue 7/21/09	Mon 9/14/09
40	1.1.3 - Prepare Draft List of Water Supply Alternatives	30 days	Tue 7/21/09	Mon 8/31/09
41	1.1.4 - Study Commission QA/QC	10 days	Tue 9/15/09	Mon 9/28/09
42	1.1.5 - Prepare Final List of Water Supply Alternatives	15 days	Tue 9/29/09	Mon 10/19/09
43	1.1.6 - Prepare Brief Summary Task Report	15 days	Tue 9/29/09	Mon 10/19/09
44	**1.2 - Summarization of Water Supply Alternatives**	**73 days**	**Thu 10/1/09**	**Mon 1/11/10**
45	1.2.1 - Compilation by Water Supply Alternative	50 days	Thu 10/1/09	Wed 12/9/09
46	1.2.2 - Prepare Brief Summary Task Report	30 days	Tue 12/1/09	Mon 1/11/10
47	**1.3 - Data Gap Analysis**	**80 days**	**Mon 1/4/10**	**Fri 4/23/10**
48	1.3.1 - Contact all major water providers	15 days	Mon 1/4/10	Fri 1/22/10
49	1.3.2 - Data gap assessment	30 days	Mon 1/4/10	Fri 2/12/10
50	1.3.3 - Prepare Draft List of Additional Studies	20 days	Mon 2/1/10	Fri 2/26/10
51	1.3.4 - Study Commission QA/QC	10 days	Mon 3/1/10	Fri 3/12/10
52	1.3.5 - Prepare Final List of Additional Studies	30 days	Mon 3/15/10	Fri 4/23/10
53	**2 - Socioeconomic Impacts**	**265 days**	**Mon 11/2/09**	**Fri 11/5/10**
54	**2.1 - Kickoff Meeting**	77 days	Mon 11/2/09	Tue 2/16/10
55	**2.2 - Literature Review**	**131 days**	**Mon 11/2/09**	**Mon 5/3/10**
56	2.2.1 - Conduct Literature Review	70 days	Mon 11/2/09	Fri 2/5/10
57	2.2.2 - Prepare Draft Methodology Memorandum	20 days	Mon 3/1/10	Fri 3/26/10
58	2.2.3 - Study Commission QA/QC	11 days	Mon 3/29/10	Mon 4/12/10
59	2.2.4 - Prepare Final Methodology Memorandum	15 days	Tue 4/13/10	Mon 5/3/10
60	**2.3 - Identification & Evaluation of Socioeconomic & Demographic Impacts**	**74 days**	**Tue 5/4/10**	**Fri 8/13/10**
61	2.3.1 - Identification of Impact Areas	20 days	Tue 5/4/10	Mon 5/31/10
62	2.3.2 - Identification of Impacts	20 days	Tue 6/1/10	Mon 6/28/10
63	2.3.3 - Analysis of Impacts	20 days	Tue 6/29/10	Mon 7/26/10
64	2.3.4 - Calculation of the Net Economic Impacts	14 days	Tue 7/27/10	Fri 8/13/10
65	**2.4 - Prepare Draft Task Report**	**60 days**	**Mon 8/16/10**	**Fri 11/5/10**
66	2.4.1 - Prepare Draft Task Report	30 days	Mon 8/16/10	Fri 9/24/10
67	2.4.2 - Study Commission QA/QC	10 days	Mon 9/27/10	Fri 10/8/10
68	2.5 - Prepare Final Task Report	20 days	Mon 10/11/10	Fri 11/5/10
69	**3 - Water Conservation and Reuse Strategies**	**102 days**	**Mon 6/1/09**	**Tue 10/20/09**
70	**3.1 - Review 2006 Region C Water Plan's (2006 Plan) Strategies for Water Conservation and Reuse for Each User Group**	**44 days**	**Mon 6/1/09**	**Thu 7/30/09**
71	3.1.1 - Review water demand projection bases, methodologies, and estimates in the 2006 Plan	5 days	Mon 6/1/09	Fri 6/5/09
72	3.1.2 - Review water conservation and reuse strategies in 2006 Plan for each of the following water user groups:	27 days	Mon 6/8/09	Tue 7/14/09



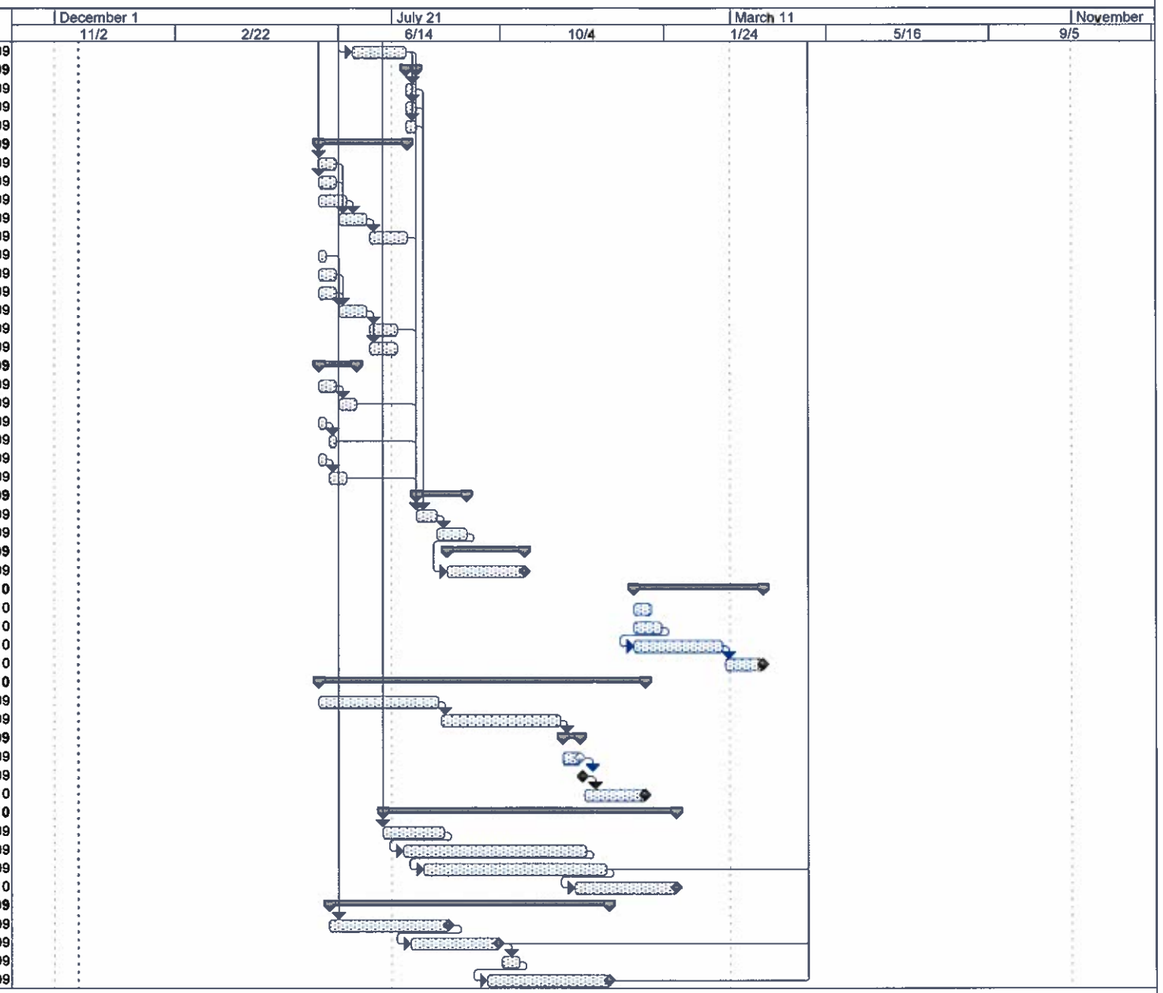
Project: Project1
Date: Wed 12/17/08

Task — Progress — Summary — External Tasks — Split

Split — Milestone — Project Summary — External MileTask

Preliminary Region C Water Supply Study Schedule

ID	Task Name	Duration	Start	Finish
73	3.1.3 - Prepare tabulation and summary of specific strategies, methodologies, and assumptions utilized for including or omitting	27 days	Wed 6/24/09	Thu 7/30/09
74	**3.2 - Identify State-of-the-Art Best Management Practices for Water Conservation and Reuse in Region C**	**5 days**	**Fri 7/31/09**	**Thu 8/6/09**
75	3.2.1 - Develop list of potential state-of-the-art water conservation best management practices	5 days	Fri 7/31/09	Thu 8/6/09
76	3.2.2 - Develop list of potential state-of-the-art water reuse best management practices	5 days	Fri 7/31/09	Thu 8/6/09
77	3.2.3 - Develop list of potential state-of-the-art drought management best practices	5 days	Fri 7/31/09	Thu 8/6/09
78	**3.3 - Evaluate Water Conservation and Reuse Practices for Region C**	**45 days**	**Mon 6/1/09**	**Fri 7/31/09**
79	3.3.1 - Evaluate water conservation strategies identified in the 2006 Plan identified as "potentially feasible"	10 days	Mon 6/1/09	Fri 6/12/09
80	3.3.2 - Determine the data needs for conservation strategies deemed infeasible in the 2006 Plan due to lack of data.	10 days	Mon 6/1/09	Fri 6/12/09
81	3.3.3 - Evaluate new potentially feasible water conservation strategies.	15 days	Mon 6/1/09	Fri 6/19/09
82	3.3.4 - Develop estimates of potential water savings for potentially feasible water conservation strategies	15 days	Mon 6/15/09	Fri 7/3/09
83	3.3.5 - Develop opinion of probable costs for potentially feasible water conservation strategies	20 days	Mon 7/6/09	Fri 7/31/09
84	3.3.6 - Evaluate water reuse strategies identified in the 2006 Plan identified as "potentially feasible"	5 days	Mon 6/1/09	Fri 6/5/09
85	3.3.7 - Determine the data needs for reuse strategies deemed infeasible in the 2006 Plan due to lack of data.	10 days	Mon 6/1/09	Fri 6/12/09
86	3.3.8 - Evaluate new potentially feasible water reuse strategies	10 days	Mon 6/1/09	Fri 6/12/09
87	3.3.9 - Develop estimates of reduced water demand projections for potentially feasible water reuse strategies	15 days	Mon 6/15/09	Fri 7/3/09
88	3.3.10 - Develop opinion of probable costs for potentially feasible water conservation strategies	15 days	Mon 7/6/09	Fri 7/24/09
89	3.3.11 - Evaluate drought management strategies and their applicability to reducing water demand projections.	15 days	Mon 7/6/09	Fri 7/24/09
90	**3.4 - Evaluate Water User Group 2009 Responses**	**20 days**	**Mon 6/1/09**	**Fri 6/26/09**
91	3.4.1 - Evaluate reported utility water conservation strategies in comparison with best management practices.	10 days	Mon 6/1/09	Fri 6/12/09
92	3.4.2 - Evaluate cost effectiveness of water conservation best management practices for Region C utilities.	10 days	Mon 6/15/09	Fri 6/26/09
93	3.4.3 - Evaluate reported utility water reuse strategies in comparison with best management practices.	5 days	Mon 6/1/09	Fri 6/5/09
94	3.4.4 - Evaluate cost effectiveness of water reuse best management practices for Region C utilities.	5 days	Mon 6/8/09	Fri 6/12/09
95	3.4.5 - Evaluate reported utility drought management strategies in comparison with best management practices.	5 days	Mon 6/1/09	Fri 6/5/09
96	3.4.6 - Evaluate cost effectiveness of drought management best practices for Region C utilities.	10 days	Mon 6/8/09	Fri 6/19/09
97	**3.5 - Prepare Findings on Water Conservation and Reuse Strategies in Region C**	**25 days**	**Fri 8/7/09**	**Thu 9/10/09**
98	3.5.1 - Prepare documentation of study methodology and results obtained from each of the water user group.	10 days	Fri 8/7/09	Thu 8/20/09
99	3.5.2 - Prepare recommendations on definitive tasks.	15 days	Fri 8/21/09	Thu 9/10/09
100	**3.6 - Prepare Final Task Report**	**38 days**	**Fri 8/28/09**	**Tue 10/20/09**
101	3.6.1 - Assemble and deliver final report	38 days	Fri 8/28/09	Tue 10/20/09
102	**5 - Determination of Mitigation Burden to be Shared**	**65 days**	**Mon 1/4/10**	**Fri 4/2/10**
103	5.1 - Goal Ranking & Conceptual Design	10 days	Mon 1/4/10	Fri 1/15/10
104	5.2 - Data Development	15 days	Mon 1/4/10	Fri 1/22/10
105	5.3 - GIS Application & Development	45 days	Mon 1/4/10	Fri 3/5/10
106	5.4 - Prepare Final Task Report	20 days	Mon 3/8/10	Fri 4/2/10
107	**6 - Determining Innovative Methods of Compensation to Affected Property Owners**	**161 days**	**Mon 6/1/09**	**Mon 1/11/10**
108	6.1 - Literature Search	60 days	Mon 6/1/09	Fri 8/21/09
109	6.2 - Expert Interviews	60 days	Mon 8/24/09	Fri 11/13/09
110	**6.3 - Summarize Literature Search and Expert Interviews (Draft Report)**	**10 days**	**Mon 11/16/09**	**Fri 11/27/09**
111	6.3.1 - Study Commission QA/QC	10 days	Mon 11/16/09	Fri 11/27/09
112	6.4 - Compensation Workshop	1 day	Mon 11/30/09	Mon 11/30/09
113	6.5 - Finalize Draft Task Report	30 days	Tue 12/1/09	Mon 1/11/10
114	**7 - Evaluate Minimum Number of Surface Acres Impacted**	**144 days**	**Wed 7/15/09**	**Mon 2/1/10**
115	7.1 - Review Methodologies and Estimates	30 days	Wed 7/15/09	Tue 8/25/09
116	7.2 - Data Acquisition	90 days	Wed 7/29/09	Tue 12/1/09
117	7.3 - GIS Application & Development	90 days	Wed 8/12/09	Tue 12/15/09
118	7.4 - Prepare Final Task Report	50 days	Tue 11/24/09	Mon 2/1/10
119	**8 - Identify Locations of Proposed Reservoir Sites and Proposed Mitigation Sites**	**139 days**	**Mon 6/8/09**	**Thu 12/17/09**
120	8.1 - Land Ownership Determination	60 days	Mon 6/8/09	Fri 8/28/09
121	8.2 - Satellite Imagery	45 days	Mon 8/3/09	Fri 10/2/09
122	8.3 - Study Commission QA/QC	10 days	Mon 10/5/09	Fri 10/16/09
123	8.4 - Merge Data onto Satellite Imagery (If Directed by Study Commission)	60 days	Fri 9/25/09	Thu 12/17/09



Project: Project1
Date: Wed 12/17/08

Task | Progress | Summary | External Tasks | Split
Split | Milestone | Project Summary | External MileTask

EXHIBIT F

Resumes

W.H. Espey, Jr., Ph.D., P.E., D.WRE

President – Proposed Project Principal – QA/QC

EDUCATION

- B.S., Civil Engineering, The University of Texas at Austin, Texas, 1960
- M.S., Civil Engineering, The University of Texas at Austin, Texas, 1963
- USGS, Management, Short Course, Washington D.C., 1963
- Ph.D., Civil Engineering, The University of Texas at Austin, Texas, 1965
- Manhattan College, June 1969, Stream and Estuarine Analysis Course

PROFESSIONAL REGISTRATIONS

- Registered Professional Engineer, State of Texas
- Registered Professional Engineer, State of Oklahoma
- Registered Professional Engineer, State of Louisiana

FIELDS OF EXPERIENCE

Dr. Espey is a registered professional engineer with over 40 years experience in environmental and water resources engineering with particular emphasis in the areas of water resources (water availability, water resources planning, water rights). His primary responsibilities include the management and implementation of projects in the areas of water supply and water planning. Dr. Espey's experiences in the fields of water resources include consulting, research, and teaching. He has taught course in hydraulics and hydrology, mechanics of materials, and fluid mechanics. His research has been concerned with problems in the areas of flood frequency, urban hydrology, cohesive sediments, mixing and diffusion in estuary systems, free surface flow, and photogrammetry.

Dr. Espey's water resources experience include numerous projects concerned with Texas Water Rights (prior appropriation doctrine) and the associated hydrologic modeling reflecting:

- reservoir/stream water quality modeling
- surface water hydrology
- environmental flow issues
- reservoir/system operations,
- recharge/channel losses,
- water rights evaluation,
- naturalized flows,
- estuary freshwater inflow requirements,
- reservoir/stream water quality modeling
- surface water hydrology

The following represents a selected list of Dr. Espey's water resources project experience and additional experiences related to relevant hydrologic modeling and river basin management:

- LCRA/SAWS Water Supply Project - Matagorda Bay Health Study Evaluation
- San Antonio River Instream Flow Planning Project – San Antonio River Authority
- Guadalupe and San Antonio River Basins, Water Availability Study, San Antonio River Authority, Guadalupe-Blanco River Authority, City of San Antonio

- Water Quality Impact of Waste Discharge from Temple-Eastex Fiberboard Plant, Temple Industries

- Galveston Bay Freshwater Inflow Study – City of Dallas, City of Houston, North Texas Municipal Water District, Tarrant Regional Water District, and the Trinity River Authority

- San Antonio/Nueces-Nueces/Rio Grande Water Availability Model (TNRCC, 2001) – Used SWAT to estimate runoff in the coastal river basins to be used as naturalized flows for the water availability modeling effort.

- Medina Lake Hydrology Study (Authority 1984) – Project Principal. Development of a reservoir system model to determine the feasibility of using Medina Lake to recharge the Edwards Aquifer. Analysis included development of recharge and leakage curves for the main and diversion lakes.

- Water Availability Study for the Guadalupe and San Antonio River Basins (1986) – Comprehensive Hydrologic model development for the combined Guadalupe and San Antonio River Basins, including firm-yield analyses of single and combined operations of several proposed reservoirs.

- Water Rights Model Evaluation (TNRCC, 1998) – Project Principal. Assisted in the evaluation of various water availability models: 1) MIKE BASIN, 2) MODSIM, and 3) WRAP for application to the state of Texas in order to meet SB1 requirements.

- Water Availability Study Trinity River Basin (City of Houston, Tarrant Regional Water District, Trinity River Authority, 1997-1999) – Project Principal. Determine the effect of the TRWD reuse application of the yield of Lake Livingston/Wallisville System.

- Neches River Water Availability Model (TNRCC/Brown & Root, 1998) – Project Principal. Application of WRAP to determining water availability for each water right holder as required by SB1.

- Trinity River Water Availability Model (Texas Natural Resources Conservation Commission, 1999-2000) - Project Principal. Water availability model for the Trinity, San Jacinto, Trinity-San Jacinto, and Neches-Trinity River Basins. As part of the naturalization process, recharge/channel losses were determined in five (5) reaches of the Trinity River.

- Report on Water Availability for the Guadalupe/Lavaca River Basin – Water Rights Demands and Supply Alternative Analysis – (Calhoun and Victoria Counties, Tx).

- Trinity River Yield Study (Trinity River Authority, 1982-84) – Hydrologic model development and firm-yield analyses for various proposed alternative development scenarios within the Trinity River Basin.

- Upper Guadalupe River Basin Water Supply Project (Upper Guadalupe River Authority) – Hydrologic firm-yield water supply study for three proposed on-channel reservoirs in the Upper Guadalupe River Basin.

- Engineering Analysis and Hydrologic Modeling to Determine the Effects of Subordination of Hydropower Water Rights to Increase the Firm Yield of Canyon Reservoir (Guadalupe, Blanco River Authority).

- Brush Control Water Yield (Texas Water Development Board, 1999) – Project Principal. Evaluation of the SWAT and SPUR hydrologic models for estimating increase water yield, from springs in the Concho River Basins, a result of "brush control measures".

- Red and Canadian River Water Availability Model - Dr. Espey was the project manager for the Red and Canadian River Water Availability Model for the TNRCC. Dr. Espey assisted in development of the project management plan and detailed workplan including selection of control points, evaluation of Streamflow gages in Texas and Oklahoma, developing naturalization procedures and evaluating the Red River Compact. Dr. Espey is currently assisting in the collection of data and generation of naturalized flows, and providing QA/QC for GIS coverages produced by TNRCC and the Center for Water Resources at the University of Texas.

- Water Availability Models Evaluation - Dr. Espey was the project manager for the Water Availability Models Evaluation for the TNRCC. Specifically, he reviewed numerous surface water models such as: MIKE-BASIN, HEC-5, STATEMOD, and WRAP to determine which model should be used by the State to meet the requirements of Senate Bill 1 (SB1). Specific responsibilities of this project included evaluating programming code, basic model functions, prior appropriations, and output generated. Water right scenarios were created for each model to evaluate the ability of each model to simulate system operations. Several GUIs were also evaluated to determine the most effective match of model engine and GUI. The GUIs evaluated were VWRAP, HEC-PREPRO, and MIKE-WRAP. EC recommended to the TNRCC that WRAP be used as the water availability model and the HEC-PREPRO be used as the GUI.

- Galveston Bay Freshwater Inflow Study Dr. Espey is the project principal for this project sponsored by the Trinity River Authority, City of Dallas, City of Houston, Tarrant Regional Water District and North Texas Municipal Water District. Dr. Espey is ultimately responsible for the acquisition and adjustment of the TPWD fisheries database, evaluation of the database that was to be used in the analysis process, evaluation of the methodology used in creating inflow requirements based on TWDB harvest data and is currently evaluating the fisheries data to harvest data. Database evaluation and methodology research is currently being completed.

- USCE, Chicago District Dr. Espey was appointed by the USCE, Chicago District to serve as chairman of the First, Second, Third, Fourth, Fifth, and Sixth Technical Committees as mandated by the modified Supreme Court Decree of December 1980.

- ASCE External Review Panel. The ASCE convened an External Review Panel, requested by Secretary of Army to review the work by the Interagency Performance Evaluation Task Force (IPET) on Katrina/New Orleans and to report findings directly to the National Research Council, (NRC). Larry H. Roth, Deputy Executive Director in consultation with the leadership of the ASCE and Environmental Water Resources Institute, stated that "Dr. W. H. Espey, Jr. was selected (October 2005) as team leader for the Internal Urban Drainage Review because of his national reputation and expertise in hydrology, drainage, and flood control.

Dr. Espey has specifically been involved in a number of Water Resources projects concerned with flood plain and floodway delineation, master drainage studies, water supply, water conservation, return flows and several major water reservoir projects. Many of these projects use basic analytical tools, computer models such as HEC-I and HEC-II. In addition, he was involved in the design of major drainage improvements concerning land development and major channel rectification projects in various urban areas. A major urban hydrology research project for HEC (USCE) was concerned with the effects of urbanization on flood discharges as modeled by SCS-TR-55 computer model. Dr. Espey directed this

research which consisted of compilation of urban hydrologic data and the application of the SCS model to urban watersheds. Another significant hydrologic research project that dr. Espey directed was the expansion and application of SWMM water quality computer model to a large land development projects, the Woodlands, Title VII, New Town. The SWMM model was applied to this 18,000-acre development and expanded to model nutrient loading and the effects of porous pavement. He was also involved in projects concerning the allocation and water rights associated with flow diversions for both municipal and industrial use. In addition, Dr. Espey was involved in various projects that were concerned with survey of various water users with regard to available water supply. These surveys included detailed evaluation of historical records concerning water use, consumptive use; return water, and existing water rights.

Dr. Espey has specific technical training in the water resources engineering including the following disciplines: flood control, drainage, water distribution/storage systems, erosion, hurricane surge, hydrology and sedimentation. His specific background in hydraulic/fluid mechanics also include various pipe network models such as kypipe and epanet. His experience includes various hydraulic machinery such as pumps, impulse turbins, surge tanks, booster pumps and associated cavatation. He has taught course fluid mechanics dealing with laminar and turbulent flow in pipes, drag forces, turbo machinery, dimensional analysis energy and momentum principles.

His water resources engineering experience includes hydraulic, hydrology, flood control, drainage, erosion and sedimentary. His specific experience also includes numerous projects concerning water supply distribution system. Dr. Espey has participated in a number of major water supply projects including the 100 mgd expansion to the Ullrich Water Treatment Plant which included in the expansion the following: 1) six clarifiers, 2) twelve filters, 3) raw water lines, 4) pumps and 5) activated carbon treatment facility. In addition, Dr. Espey has been involved in a number of private and city of Austin projects concerning water delivery lines and associated water pressure through out the central Texas area. These water system projects have included feasibility planning, design and construction. Several projects have been concerned with system evaluation in terms of capacity, condition, maintenance history and equipment. These projects have included the City of Rio Rancho water and wastewater system and Santa Fe water supply system. City of Rio Rancho was purchasing the water and wastewater system from Rio Rancho utilities. City of Santa Fe was purchasing the water system from Sangre de Cristo Water Company.

Specifically, Dr. Espey also has experience in developing water quality models/sampling programs/management plans for the following lakes: 1) Cedar Creek, Texas, 2) Town Lake (Austin, Texas and Dallas, Texas), 3) Cross Lake (Shreveport, Louisiana), 4) Lake Austin, Texas, 5) Toledo Bend Reservoir, Texas, 6) Lake Houston, Texas, 7) Tributary Lakes/Red River, Louisiana, 8) Lake Travis, Texas, 9) Lewis Creek, 10) Lake Texoma, Texas, 11) Martin Lake Mine, Texas, 12) Big Cajun/Oxbon Lignite Mine Lake, Louisiana, 13) Moticello Mine Lake, Texas, 14) Lake Amistad, Texas, 15) Coleto Creek, Texas, 16) Eagle Mountain, and 17) Lake Dunlap, Texas.

Dr. Espey has also has experience in water quality modeling for the following rivers and streams in Texas: San Antonio, Cedar Creek, Guadalupe, Blanco, Pedernales, Houston Ship Channel, San Marcos, Colorado, Nueces, Neches, Trinity, Sabine, Brazos and Red.

Highlights of Dr. Espey's relevant project experience includes the following:

- Project principal involved in a project for New Braunfels Utilities to assess the water quality impacts of point and non-point source nutrient loading to Lake Dunlap. Dr. Espey assisted in the following tasks : 1) Review of water quality data from numerous sources for Lake Dunlap, 2) Review of water quality analysis and modeling performed by TCEQ staff., 3) Calculate point and non-point source loadings to Lake Dunlap, 4) Create a Vollenweider model for Lake Dunlap, 5)

Perform regression analysis for total phosphorus vs. chlorophyll A, 6) Evaluate possible eutrophication trends for future conditions depending on phosphorus limits on wastewater treatment plants and 7)Develop recommendations for sampling plan to determine nutrient levels and sources.

- Project principal for the Tarrant Regional Water District (TRWD) reservoir/stream water quality-modeling project. Dr. Espey has been involved in the following tasks: 1) evaluation of nutrient loading/associated water quality standards, 2) Stream sampling protocol, 3) Analysis of dye attenuation field studies, 4) QualTX and Qual 2E one-dimensional modeling of stream inputs for Cedar Creek and 5) WASP6.1 modeling development of the Cedar Creek Reservoir.

- Project principal for the Houston Ship Channel Aeration Project for the Texas Water Development Board. Water quality modeling designed to evaluate differing alternative reaeration systems for the Houston Ship Channel to improve water quality.

- Project manager for a Water Quality Modeling/Wastewater Discharge evaluation of Plum Creek – City of Houston. Evaluation of the affects of wastewater discharge on the water quality of Plum Creek.

- Project principal for an Amite River Flood Control and Water Quality Analysis – Department of Public Works, State of Louisiana. Preliminarily engineering evaluation of flood control reservoir alternative sites. Water quality modeling was also performed to determine the beneficial impacts of the reservoirs to the water quality of the river downsteam.

- Project principal for a Water Quality Modeling/Analysis for Town Lake – City of Dallas. Evaluation of water quality conditions for proposed Town Lake alternatives.

- Project manager for the Little Cypress Reservoir/Water Quality Modeling project – Little Cypress Utility District. Evaluation of water quality conditions based on projected waste loading and flow restrictions.

- Project principal for the Stacy Reservoir Environmental Assessment – Colorado River Municipal Water District. Water quality analysis of proposed Stacy Reservoir. Analysis included evaluation of water quality conditions of the reservoir.

David K. Harkins, Ph.D., P.E.

Vice President

EDUCATION

- B.S. Petroleum Engineering, Texas Tech University, 1992
- M.S. Civil Engineering, Texas Tech University, 1995
- Ph.D. Civil Engineering, Texas Tech University, 1998

PROFESSIONAL REGISTRATIONS

- Texas State Board of Professional Engineers – Professional Engineer # 87732
- Oklahoma State Board of Professional Engineers – Professional Engineer # 20986

FIELDS OF EXPERIENCE

Dr. David K. Harkins is the vice president and managing engineer of the water resources/environmental section of Espey Consultants, Inc. (EC) in Austin, Texas. Dr. Harkins has over 12 years of experience in water resources and environmental engineering design and planning including studies dealing with water supply, water availability modeling, water resources management, instream flow analysis, water quality analysis and modeling, wastewater permitting, environmental flow analysis, bay and estuary evaluations, groundwater modeling and management planning. Dr. Harkins has been involved in a variety of civil and environmental projects at EC.

Surface Water Projects

Raw Water Supply Conveyance Analysis – (San Jacinto River Authority): EC was contracted by SJRA to conduct an evaluation of the SJRA's raw water canal system. Dr. Harkins is the project manager and is responsible for a detailed field assessment, security/risk assessment, hydraulic models of the system, water storage capacity of the Highlands Reservoir, water quality investigations, a geodatabase and map of the system and the development of a capital improvement program for long term improvements to the system.

Springflow Augmentation – Austin, Texas: EC, as part of a subcontract with LBG-Guyton Associates, assisted the Edwards Aquifer Authority with an analysis of springflow augmentation for Comal and San Marcos Springs. Dr. Harkins was the EC project manager and was primarily responsible for developing several alternatives for augmentation water. Dr. Harkins evaluated numerous sources such as Carrizo Wilcox groundwater, Edwards Aquifer water and surface water from the Guadalupe. Dr. Harkins also assessed the feasibility of each of the water sources including preliminary cost estimates for the purchase of water(Edwards water rights, surface water rights or contracts), transmission pipelines, treatment costs, land purchases (groundwater development and pipeline easements) and application systems at the spring reaches. Each of the alternatives was developed to compare the cost, reasonableness, and effectiveness. Other alternatives were also investigated as alternatives to costly augmentation strategies. These included: purchasing Edwards water rights to minimize local impacts of pumping during drought conditions, utilization of inflatable dams for recirculation of existing water in the system in specific areas that allow for the most benefit for existing organisms.

Reallocation of Storage in Federal Reservoirs for Water Supply – Waco, Texas: Dr. Harkins is the EC project manager for a joint project between the Texas Water Development Board (TWDB), Brazos River Authority (BRA) and United Stated Army Corp of Engineers (USACE). The project is to investigate the potential for reallocating storage in USACE reservoirs in Texas to meet increasing water supply demands. Dr. Harkins was responsible for determining what procedures are required to convert the storage in the State permitting context. Dr. Harkins was also involved in developing a model to

evaluate a case study for the Little River system to analyze the amount of additional water supply that could be achieved utilizing reallocation.

Matagorda Bay Health Evaluation – Austin, Texas: Dr. Harkins has been involved in the Matagorda Bay portion of the Lower Water Supply Project for the Lower Colorado River Authority (LCRA) and San Antonio Water System (SAWS). Dr. Harkins has assisted in scope development, model review, data collection and analysis, candidate measures selection for bay health, evaluation of the Colorado and coastal water availability models.

Reservoir Sedimentation Analysis – Montgomery Co., Texas: Dr. Harkins was hired to provide expert testimony and analysis of hydrology and watershed characteristics for the increased sedimentation of Deer Lake. Dr. Harkins analyzed development activities upstream of Deer Lake and investigated the impacts of the development on sedimentation in the surrounding creeks and Deer Lake.

San Antonio Bay Health Evaluation – San Antonio, Texas: Dr. Harkins assisted in a study of instream flows necessary to maintain the health of the San Antonio bay and estuary. The study was sponsored by the San Antonio River Authority, San Antonio Water Systems and Guadalupe-Blanco River Authority. The project consisted of a review of State methodology, data collection and assessment with an intensive study into the equations used to develop harvest equations used to quantify the health of the bay. Dr. Harkins assisted in data assessment, acquisition and evaluation of the data. Numerous state and federal agencies were contacted for physical, chemical, biological, hydrological, meteorological, and ecological data such as TWDB, TCEQ, TPWD, TDH, NMFS, NWS, USGS, etc. The majority of data was acquired and inventoried into a database for evaluation of temporal, spatial, parameters measured, format, accessibility and costs to acquire.

Oklahoma Firm Yield Analysis – Oklahoma City, Oklahoma: Dr. Harkins was the project manager for a project involving the review of firm yields of numerous reservoirs in Oklahoma. The firm yields estimates found in the Oklahoma Water Resources Board (OWRB) 1995 Water Plan, OWRB internal reservoir summary sheets and the U. S. Corp. or Engineers (USACE) firm yield summaries were analyzed and compared to determine discrepancies in firm yields between publications. As part of this project, Dr. Harkins also determined the unappropriated firm yield for each of the reservoirs (that part of the firm yield that has not been permitted for water use). The reservoirs evaluated in this study were Canton Lake, Lake Overholser, Lake Hefner, McGee Creek Reservoir, Atoka Lake, Hugo Lake, Lake Sardis and Lake Stanley Draper. Dr. Harkins collected water rights and historical water use information from OWRB staff members for each segment of the North Canadian, Canadian, Cimarron and Kiamichi Rivers.

Determination of Firm Yield of the North Canadian System – Oklahoma City, Oklahoma: Dr. Harkins, as part of a subcontract with Montgomery Watson Harza, assisted in the collection of data for the development of a WRAP model to determine the firm yield of the Canton Reservoir plus verification of Overholser and Hefner reservoir firm yields. This information was provided to Oklahoma City for inclusion in the Oklahoma City Water Master Plan. Dr. Harkins assisted in data collection including monthly hydrologic data from USGS gaging stations and historical records. Dr. Harkins also assisted in the collection of evaporation, precipitation and reservoir data such as area capacity curves, sedimentation records, diversions and impoundment amounts. Dr. Harkins assisted in the development of all model input for this project and was directly responsible for the development of the WRAP model used to simulate the system. Finally, Dr. Harkins performed WRAP simulations to determine the firm yield of the reservoirs based on water right information, reservoir impoundment, instream flow requirements, control points and various system scenarios. In addition, mitigation strategies were developed to reduce water demands and address drought conditions. Dr. Harkins assisted Oklahoma City in determining the reliability of the existing water rights and to define additional water supplies that could be available to meet future regional water demands.

Seven Basin Recharge Study (Edwards Aquifer Authority) – San Antonio, Texas: Dr. Harkins participated on a team to evaluate the recharge to the Edwards Aquifer for seven different river basins. HSPF was utilized in this study to estimate the amount of runoff generated on each of the watershed utilizing different assumptions for land use, soil type, etc. to be used in planning purposes for future water withdrawals from the Edwards Aquifer. Dr. Harkins assisted in the development of the HSPF model. Dr. Harkins developed water use summaries for each of the water rights in each of the river basins from the WAM and other sources. Dr. Harkins assisted in data collection including USGS gage data, precipitation, evaporation, runoff and curve numbers, etc. Dr. Harkins also participated in the review and comment of the original pilot models.

Galveston Bay Freshwater Inflow Study – Austin, Texas: Dr. Harkins has been involved in an extensive analysis on the relationship between streamflows and ecological health in the Galveston Bay estuary. Sponsors of the study are TRA, TRWD, COH, COD and NTMWD. Dr. Harkins built upon and expanded previous work done by TWDB and TPWD with regard to the freshwater inflow needs of the Galveston Bay Ecological System. He has worked to research and establish with greater certainty the inflow requirements of Galveston Bay by evaluating the methodology used in the creation of these inflow requirements based on TWDB harvest, gaged, and ungaged flow data. Dr. Harkins has thoroughly researched the methodology involved in acquiring the harvest data used in the development of inflow regression equations, and performed statistical analyses of the data.

In the course of these analyses, Dr. Harkins created geospatial maps of the TPWD's independent fisheries data, utilizing ArcView, displaying time trends of catch and effort for each species utilizing the various gears utilized in the collection of the data.

Additional work performed for this project by Dr. Harkins has been the exploration of alternative management objectives for the Trinity River Basin. Dr. Harkins is currently performing hydrologic studies and analyses of yields and water availability in the Trinity/San Jacinto Basins to evaluate existing water right permit applications pending at the TCEQ. The analysis is utilizes the TCEQ Trinity and San Jacinto WAM models developed by EC. Dr. Harkins also utilized the TCEQ WAM developed for the Trinity and San Jacinto River Basins to evaluate current water rights applications that are pending with the TCEQ.

Trinity River Water Availability Study – Austin, Texas: Dr. Harkins was the assistant project manager for the Trinity River Water Availability Study for Trinity River Authority (TRA), Tarrant Regional Water District (TRWD), and the City of Houston (COH) to determine the impact of a proposed 200 MGD water reuse project by TRWD on the yield of the Lake Livingston/Wallisville system. Responsibilities included: development of a water right input files for WRAP, determining TRWD diversion patterns for reuse diversions, evaluating several conservative assumptions used in the initial modeling effort, evaluating the new WRAP option 5 for negative incremental flows, evaluating new evaporation numbers developed by the TWDB, finalizing a "base model" for all additional modeling scenarios, and evaluating several bay and estuary (B & E) modeling scenarios. Dr. Harkins created WRAP input files for several B & E simulations using MaxH and MinQ demands placed on the system.
Evaluation of Potential Surface Water Sources in Nueces River Basin – Austin, Texas: Dr. Harkins evaluated several potential surface water sources for a confidential client in the Nueces River Basin. Dr. Harkins evaluated the WAM for the Nueces and Upper Nueces – Rio Grande Coastal River Basins to determine locations for potential unappropriated surface water. This analysis included evaluation of Scenario 3 (full water rights, no return flows) from the WAM provided by the TCEQ. Dr. Harkins also evaluated several water entities in the region to determine that potential for surface water purchase.

Water Rights and Water Availability Modeling

Water Rights Application – Austin, Texas: Dr. Harkins is the project manager for a project for the San Jacinto River Authority (SJRA) and the City of Houston (COH) dealing with water rights in the San Jacinto River Basin. Dr. Harkins was responsible for the development of three water right applications for unappropriated water (two of which the SJRA and COH split and one is solely owned by COH). Dr. Harkins also assisted in the development of two indirect reuse applications for the two entities. Activities performed for this project include: water right application preparation, evaluation of the reliability of the proposed applications in the San Jacinto Water Availability Model (WAM), evaluation of environmental flow restrictions that may be applied, submittal of the applications to the Texas Commission on Environmental Quality (TCEQ) and support to the TCEQ staff for questions about the applications.
Water Rights Review – Austin, Texas: Dr. Harkins assisted a water right holder in a coastal river basin in Texas to evaluate the marketing potential of a water right. The analysis included the evaluation of how the water right was modeled in the Water Availability Model including the reliability of the right. Additional analysis included discussions with Texas Commission on Environmental Quality (TCEQ) staff to determine the possibility of amending the permit to add additional use types as well as moving the water right.

System Operations Permit – Waco, Texas: EC, assisted the Brazos River Authority (BRA) in the development of a system operations permit for the Brazos River Basin. Dr. Harkins was the EC project manager and assisted in review of the Brazos WAM and provide recommendations to the TCEQ for changes to the model. Dr. Harkins also assisted in the modification of the Brazos WAM to incorporate a methodology for modeling the system operation permit. The system operations permit will allow the BRA to have the flexibility to utilize the reservoirs in which it has storage and water rights as a system to be able to meet demands throughout the basin and create additional yield in the system. Dr. Harkins also developed the environmental flow restrictions based on the Lyon's and Consensus methods. Dr. Harkins input these flow restrictions into the model and evaluated the impact to total firm yield of the system. Dr. Harkins also assisted in the development and application of other simulations such as 75/75 criteria and firm yield at different diversion points in the basin. Dr. Harkins assisted in creating the water right application and supporting documents as well as reviewing the drought contingency plan and water conservation plan.

Water Right Amendment – Austin, Texas: Dr. Harkins assisted the Chambers-Liberty County Navigation District (CLCND) in amending an existing water right. Dr. Harkins assisted in completing the required submittals to the TCEQ for a change of use type in the existing application. Dr. Harkins also assisted in the development of a drought management plan and water conservation plan for CLCND.

High Point Lake Estates Water Right Permit, Austin, Texas: Dr. Harkins assisted in the water right permitting application process for the High Point Lake Estates Property Owners Association by gathering the necessary documents and data for filing a permit application with the Texas Commission on Environmental Quality. Duties included updating descriptions of the amenity lakes to be permitted based on final construction plats, and assisting in the WAM modeling process for determining water right reliability.

Evaluation of Impact of Bifurcated Permitting Rules on Downstream Water Interests – Guadalupe-San Antonio River Basin, Texas: EC, as part of a subcontract with LBG-Guyton Associates, assisted the Edwards Aquifer Authority (EAA) with an evaluation of the impact of bifurcated (junior-senior) permitting rules on downstream surface water interests in the Guadalupe River Basin. EC assessed the flow of surface water and the management of surface water rights in the Guadalupe-San Antonio River Basin as it relates to the evaluation of different groundwater management scenarios for the Edwards Aquifer. Different pumping scenarios were developed in MODFLOW and GWSIM IV to represent historical pumpage, pumpage from junior and senior rights, and pumpage from only senior rights in the Edwards Aquifer. Dr. Harkins assisted in incorporated the resulting springflow estimates into the

Guadalupe-San Antonio WAM. Dr. Harkins then assisted in the determination of the impact to downstream surface water rights under the different pumping scenarios.

Conjunctive Use Analysis – Waco, Texas: EC, as part of a subcontract with Parsons Brinkerhoff, assisted the Brazos River Authority (BRA) with a conjunctive use analysis. Dr. Harkins determined the firm yield of Lake Granger utilizing the current Brazos WAM provided by the TCEQ. The analysis consisted of evaluating the firm yield of Lake Granger under different sedimentation conditions. Dr. Harkins also evaluated the additional firm yield of the reservoir through the conjunctive use of groundwater.

Water Availability Model Evaluation – Austin, Texas: Dr. Harkins participated in the Water Availability Model Evaluation for the TCEQ. Specifically, he reviewed numerous surface water models such as: MIKE-BASIN, HEC-5, STATEMOD, and WRAP to determine which model should be used by the State to meet the requirements of Senate Bill 1 (SB1) water availability modeling. Specific responsibilities of this project included evaluating programming code, basic model functions, prior appropriations, and output generated. Water right scenarios were created for each model to evaluate the ability of each model to simulate system operations. Several GUIs were also evaluated to determine the most effective match of model engine and GUI. The GUIs evaluated were VWRAP, HEC-PREPRO, and MIKE-WRAP. EC recommended to the TCEQ that WRAP be used as the water availability model and the HEC-PREPRO be used as the GUI.

Trinity Water Availability Model – Austin, Texas: Dr. Harkins was the project manager for the Trinity Water Availability Model (WAM) prepared for the TCEQ. Responsibilities included: scope of work and budget development, contract negotiations with TCEQ staff, scheduling, develop estimations for missing time periods for diversion and return flow data for naturalized flow calculations, invoicing to TCEQ from sub-consultants, monthly project summary reports, overall project management, draft and final deliverable for the four basins in this study, presentations for stakeholders meetings. Dr. Harkins assisted in a recharge/channel loss analysis on Trinity River Basin. The study included investigation and calculation of recharge/channel loss values for nine stream reaches to determine the presence and significance of recharge/channel loss. Recharge/channel loss was reported as a percentage of streamflow and distributed to other parts of the basin based on statistical computations. Dr. Harkins also performed QA/QC on the naturalization of flows computations and ArcView coverages provided by the TCEQ. Dr. Harkins assisted in the development of the WRAP input deck for the San Jacinto Basin using a GUI to facilitate the input of data into the required input deck format. He assisted the Center for Water Resources (CRWR) at the University of Texas in the location of all control point, return flow, and classified streamflow segment locations in the GIS coverage used in the modeling effort. Dr. Harkins provided technical support to CRWR, as well as, QA/QC for watershed parameters generated from the GIS coverages. He recommended changes to control point locations that needed to be moved.

Red and Canadian River Water Availability Model – Austin, Texas: Dr. Harkins was the assistant project manager for the Red and Canadian River Water Availability Model developed for the TCEQ. Dr. Harkins was directly responsible for the development of the project management plan, detailed workplan, creation of the WAM for the Red and Canadian River Basins and final report development. Dr. Harkins assisted in the collection of data for naturalized flows, and providing QA/QC for GIS coverages produced by TCEQ and the Center for Water Resources at the University of Texas.

EC, under Dr. Harkins direction, created the water rights deck required as input for the WAM used in this study, Water Rights Analysis Package (WRAP). Dr. Harkins specifically reviewed all water rights in the Red and Canadian River Basin and assisted in the development of modeling assumptions that were approved by the TCEQ. EC staff performed all modeling simulations for the Red and Canadian River Basins. The Canadian River Compact and the Red River Compact (between Texas, Oklahoma, Arkansas,

and Louisiana) were evaluated and modeled. Dr. Harkins assisted in the development of modeling procedures for the Red and Canadian River Compacts in cooperation with TCEQ staff. The final model for the Red and Canadian River Basins was submitted in December 2001.

Neches River Water Availability Model – Austin, Texas: Dr. Harkins was also involved with the Neches River Water Availability Modeling (WAM) project for the TCEQ. Primary responsibilities include: obtaining diversion and return flow data from appropriate parties and developing estimations for missing time periods for naturalized flow calculations, summarizing historical and groundwater use for each county in the Neches Basin, develop seasonal demand patterns for municipal, industrial, and irrigation uses in the Upper and Lower Neches Basin, analyzed all water rights in the Neches Basin and developed input water right deck for WRAP (including reservoir operations) using the GUI to facilitate the input of data into the required WRAP format, assisted in developing the configuration for all control points in the model, used the program RECORDS (developed by Ralph Wurbs TAMU) to distribute the naturalized flow and evaporation data from the primary control points to the secondary control points used in WRAP, assisted in preparation of draft and final report to TCEQ. Dr. Harkins assisted the CRWR locating of all control point, return flow, and classified streamflow segment locations in the GIS coverage used in the modeling effort. Dr. Harkins provided technical support to CRWR, as well as, QA/QC for watershed parameters generated from the GIS coverages. He recommended changes to control point locations that needed to be moved

Cypress Water Availability Model – Austin, Texas: Dr. Harkins was the project engineer for EC for the Cypress Water Availability Model (WAM) developed for the TCEQ. Dr. Harkins reviewed all water rights (permits and Certificates of Adjudication) in the Cypress River Basin and corrected the TCEQ ArcView coverages for water right and return flow locations. Dr. Harkins assisted in obtaining historical diversion and return flow data for the river basins and dividing the data by primary control point (or subwatershed). Dr. Harkins assisted in identifying all groundwater return flows and in the development of estimates for diversion and return flow data for missing periods in the period of record. Dr. Harkins assisted in the collection and analysis of reservoir area capacity data and reservoir operations within the Cypress River Basin. Dr. Harkins assisted in the development of the WRAP input files for the model including interbasin transfers, return flows and evaporation values. Dr. Harkins also assisted in the development of assumptions for modeling the Red River Compact issues associated with Oklahoma, Arkansas and Louisiana.

San Antonio/Nueces-Nueces/Rio Grande Water Availability Model – Austin, Texas: Dr. Harkins was the EC project manager for the San Antonio/Nueces-Nueces/Rio Grande Water Availability Model developed for the TCEQ. Dr. Harkins assisted in the collection and analysis of data in GIS format that was used to estimate runoff in the coastal river basins. Dr. Harkins assisted in the determination of the number and distribution of sub-basins to be included in naturalized flow calculations to insure the most effective use of existing data and most appropriate spatial distribution. Naturalized flows were estimated based on the NRCS curve number method and submitted to TCEQ in June 2001. Dr. Harkins has evaluated all water rights in the northern portion of the Nueces/Rio Grande River Basin and recommended modeling procedures for each. Dr. Harkins assisted in the analysis of groundwater interaction in the Nueces/Rio Grande River Basin.

Groundwater Modeling

Hydrogeologic Evaluation - Kenedy County, Texas: Dr. Harkins was retained to evaluate the hydrogeologic conditions for a wind energy generation site in Kenedy County in south Texas. Dr. Harkins evaluation consisted of determining the impacts of the wind farm site on the hydrology and sub-surface hydrology. Dr. Harkins collected and reviewed site specific data including geology reports, reports pertaining to groundwater water quality and movement, and reports consisting of wetlands and

surface water and groundwater interaction. Dr. Harkins also evaluated site specific data from construction activities including piezometer and survey data for dewatering activities. Dr. Harkins also recommended additional piezometer installation and collection of water quality data.
DCEA Mustang Power Station Groundwater Management Plan – Denver City, Texas: This groundwater management plan included groundwater resources modeling of the Ogallala Aquifer in the Southern High Plains to ensure enough groundwater supply to meet the demands of Mustang Power Station through year 2022. Under the terms of the station's contract, this plan must be re-evaluated and updated every two years to protect the groundwater resources of the Ogallala Aquifer at Mustang Station and the surrounding vicinity. Since this power station was built, Dr. Harkins has assisted in four separate groundwater modeling studies (2001, 2003, 2005 and 2007) for the facility utilizing the widely accepted Ground Water Vistas™ as the groundwater modeling tool. Some aspects of this project included the analysis of pressure transducer data from monitoring wells, development of a regional model of the Southern High Plains Aquifer and a local/subregional model of the Ogallala Aquifer at the facility, and development of a well pumping schedule with particular importance given to individual well rates and well placement to ensure that saturated thickness levels are maintained through 2022. The groundwater management plans developed from these efforts has produced a well schedule that maintains the saturated thickness (and water levels) of the Ogallala Aquifer in the vicinity through 2022, while meeting the daily water demands of the facility.

Spring Flow Evaluation – Comal County, Texas: EC, as part of a sub contract to BioWest, Inc., was retained by the Edwards Aquifer Authority to evaluate springflow in the Comal River. The project consisted of evaluation of groundwater movement in the Edwards Aquifer in relation to spring discharge at Comal and San Marcos Springs. Dr. Harkins assisted in the evaluation of groundwater modeling scenarios and determining the relationship of groundwater movement in the karst aquifer. Ultimately, the springflow discharge during historical pumping conditions from the Edwards Aquifer were related to stream flow in the Guadalupe River.

Groundwater Availability Modeling – Robertson County, Texas: EC was retained by OSR Water Supply Corporation (WSC) to provide a hydrogeologic investigation for a proposed a 2,000 gallon per minute (gpm) maximum capacity municipal water well into the Simsboro formation in Robertson County, Texas. Dr. Harkins was the project manager and was responsible for data review and evaluation, model development and project report. The primary purpose of this hydrogeologic investigation was to evaluate the groundwater resources of the Simsboro formation near the proposed OSR WSC groundwater well site. The project team utilized the Groundwater Availability Model (GAM) developed by Texas Water Development Board (TWDB) for the Central Queen City and Sparta Aquifer. The hydrogeologic report was completed and submitted as part of the groundwater application.

Groundwater Availability Modeling – Carson County, Texas: Dr. Harkins assisted in the modification of the GAM developed for the Texas Water Development Board (TWDB) for the Northern Ogallala Aquifer. The modifications were performed for the Pantex Plant located in Carson County. As part of this project, Dr. Harkins obtained the Groundwater Availability Models (GAM) from the TWDB, reviewed the model and documentation supplied by the TWDB and then executed the existing model. Dr. Harkins assisted in the modification of the model to MODFLOW SURFACT to allow the model to have pumping constraints in order to prevent the cells from going dry for the remainder of the simulation period. Additional modification included "shrinking" the grid spacing to less than the one-square-mile grid for areas of particular interest in Carson County within the Pantex Plant. New modeling scenarios were performed to determine the impact of groundwater depletion with pumpage limits in place.

Groundwater Pumpage Determination – Oklahoma: Dr. Harkins, as a subcontractor to Montgomery Watson Harza assisted in the determination of maximum pumpage rates from several aquifers in Oklahoma. Analysis included investigation of the aerial extent of these aquifers and the State regulations

of pumpage withdrawal rates based on the amount of surface acres owned. Dr. Harkins coordinated with the Oklahoma Water Resources Board and the client to facilitate information exchange.

Groundwater Availability and Feasibility – Hudspeth County, Texas: Dr. Harkins was involved in a groundwater availability and feasibility study in Hudspeth County. Dr. Harkins assisted in reviewing geologic logs in the area for water bearing strata, evaluated data obtained for water quantity and quality and evaluated the feasibility of constructing a pipeline to provide pumped water to users.

Ogallala Groundwater Modeling – Lubbock, Texas: Before Dr. Harkins began work at EC, he was a research assistant for the Department of Civil Engineering at Texas Tech University in Lubbock, Texas from Jan. 1997 to May 1998. The Texas Water Development Board (TWDB) and the Texas Tech University Water Resources Center funded Dr. Harkins' dissertation project. For his dissertation, he converted the Texas High Plains groundwater model (Ogallala Aquifer) used by the TWDB to MODFLOW. The model conversion required changes in the MODFLOW FORTRAN code to allow for transmissivity and saturated thickness constraints to be accurately defined within the MODFLOW module packages. The MODFLOW model was then used to predict how the saturated thickness of the Ogallala aquifer would be affected by future groundwater use. Dr. Harkins has published two articles on his research and presented the results at the Texas Section ASCE meeting held in May 1998.

Geology Investigation and Groundwater Contamination – Oklahoma: Dr. Harkins also performed consulting work for Cypress Engineering during the summers of 1996 and 1997. The purpose of the project was to determine the extent of groundwater contamination from a petroleum gas pump station in Oklahoma. Responsibilities included pump and monitoring well location selection and installation, pump test operations, pump test analysis and drawdown analysis, groundwater monitoring and sampling and soil vapor extraction design and installation.

Pantex/BWXT Site-wide Ecological Risk Assessment (ERA), Amarillo, Texas: Dr. Harkins assisted in a sample collection program initiated to obtain for additional data needed to support the ERA. Tasks include coordination with Pantex personnel, organization of sampling crews, sampling, QA/QC and reporting requirements. Both surface water and sediment samples are being collected at five separate playas at approximately 18 sites per playa to represent potential points of exposure and biologically active zones.

Water Quality Analysis and Modeling

Water Quality Assessment and Remediation, Hays Co., Texas: Dr. Harkins is the project manager for a natural reservoir/pond and remediation project in Hays County. EC was retained in 2006 to assess the condition of a naturally occurring reservoir after significant sedimentation caused by upstream development. Project assessment included a detailed assessment of the current water quality, background concentrations, and comparable water quality concentrations. Dr. Harkins assisted in developing a detailed report of the current conditions of the reservoir, remediation alternatives and remediation recommendations. Remediation activities began in October 2007. Recommended remediation included a pump and treat system that allowed the treated water to be returned to the pool thus minimizing impacts of water levels of aquatic and vegetative life. Dr. Harkins coordinated all subcontractors including divers, filter units and portable water storage units. The project was successfully completed in December 2007.

Water Quality Assessment and Remediation, Hamilton Pool, Travis Co., Texas (Travis County): Dr. Harkins is the project principle for a natural reservoir/pond and stream remediation project for Travis County. EC was retained by Travis County in August 2007 for assess the condition of the reservoir after significant sedimentation caused by upstream development. Project assessment included a detailed assessment of the current water quality, background concentrations, and comparable water quality concentrations. Remediation alternatives are under investigation.

Water Quality Modeling of Lake Dunlap (New Braunfels Utilities) – New Braunfels, Texas: As part of wastewater permit renewal process, in Phase I of this analysis, Dr. Harkins evaluated numerous water quality studies, evaluated the Vollenweider model simulations developed by Texas Commission on Environmental Quality (TCEQ) on which the wastewater discharge permit renewal decision will be determined, calculated point and non-point source loadings entering Lake Dunlap from the Comal and Guadalupe Rivers and developed Vollenweider models to determine the impact of point and non-point source nutrient loadings on Lake Dunlap. Dr. Harkins also developed regression equations for total Phosphorus and Chlorophyll A for reservoirs with similar size, depth and detention times.

As part of Phase II, Dr. Harkins is currently the project manager for EC for New Braunfels Utilities (NBU) conducting an eighteen month water quality sampling project. The scope of the project is to collect surface water samples in order to obtain information to assist in determining whether nutrient limitations on point source discharges from NBU's wastewater treatment plants (WWTPs) will prevent the growth of excessive aquatic vegetation in receiving waters, as provided by the TCEQ regulations at 30 TAC 307.4(e). The results of the sampling program will be utilized in the decision for a contested case hearing at TCEQ.

Water Quality Assessment and Evaluation for Lake Palestine, Cedar Creek Reservoir, Richland Chambers Reservoir and Joe Pool (City of Dallas and Tarrant Regional Water District) - Dr. Harkins is the project manager for a water quality assessment and evaluation. The project is a proposed interbasin transfer of water to the Trinity River Basin from Lake Palestine. This project involved collection and analysis of water quality data in the four reservoirs, development of a water quality database, water quality impact analysis, treatability of the combine water sources and evaluation of environmental impacts. Dr. Harkins was responsible for developing mass balance evaluations of the reservoirs based on different pipeline alternatives and differing amounts of water and analyzing the impacts of those water volumes on the receiving body of water.

Water Quality Pond Assessment (City of Austin) – Dr Harkins was the project manager for a City of Austin project to evaluate the applicability of utilizing treated wastewater effluent as make-up water for stormwater quality / wet ponds. The project included a detailed literature review of existing facilities utilizing effluent as make-up water. Dr. Harkins also participated in field sampling for one of the City's wet ponds as well as developing a scope to initiate a field study to test the potential of utilizing wastewater effluent as make-up water.

Water Quality Evaluation and Modeling – (Trinity River Authority) EC was selected to perform a water quality modeling and effluent discharge study on Mountain Creek and backwaters of Joe Pool. Dr. Harkins is the project manager for the project and obtained and analyzed the TCEQ continuously stirred tank reactor (CSTR) mass balance model for Lake Padera using default geometry and hydraulics. EC conducted field measurements including stream cross-sections; flow and standard water quality parameters. Dr. Harkins assisted in the development of a new QualTX model utilizing the new field data. The modified CSTR and QualTX models were then utilized to perform numerous model scenarios. The scenarios were completed to evaluate the feasibility of modifying the Mountain Creek Regional Wastewater System service area to include additional customer cities due to growth in the surrounding areas or constructing a second wastewater treatment facility. Based on the model results, EC recommended expansion of the existing wastewater treatment plant.

Water Quality Modeling for Cedar Creek Reservoir (Tarrant Regional Water District) – Fort Worth, Texas: Dr. Harkins is the project manager for a water quality modeling project for TRWD. Dr. Harkins was responsible for the development and calibration of the riverine and reservoir water quality models utilized in this project. Dr. Harkins assisted in the updating of the existing WASP model to WASP6.1, developed point and non-point source modeling simulations for WASP6.0, assisted in the

development and application of QUALTX and QUAL2E models for Kings and Cottonwood Creeks. The WASP6.1 model will be used as a tool to analyze the impacts of multiple point and non-point source discharges on Cedar Creek to assist TRWD in developing watershed regulations to maintain water quality in Cedar Creek Reservoir. These simulations are performed by assuming different Best Management Practices (BMPs) in the watershed. The model assisted in determining which BMPs should be implemented to further protect water quality in TRWDs reservoirs as well as evaluating which of those BMPs are most economical to implement. This project also involves similar analysis for Eagle Mountain Reservoir and Lake Benbrook watersheds.

Water Quality Analysis, Trinity River and Lake Houston (Coastal Water Authority), Dr. Harkins is the project manager for a project to assess the impact of Trinity River water entering Lake Houston through Luce Bayou. The project is a proposed interbasin transfer of up to 400,000 ac-ft/yr of water from the Trinity River Basin. The Trinity River water has a better water quality than that of Lake Houston. This project involved collection and analysis of water quality data in the Trinity and San Jacinto River Basins, development of a water quality database, water quality impact analysis, treatability of the combine water sources and evaluation of environmental impacts. The additional water supply into Lake Houston would provide water for Harris County in the future.

Water Quality Modeling, (Private Developer) Tres Palacios Bay, Texas, Dr. Harkins performed dissolved-oxygen water quality modeling using QualTX to determine suitable depth and configuration of tidally-influenced, constructed canals. Dr. Harkins also assisted in two-dimensional hydrodynamic modeling using RMA-2 to determine circulation patterns within proposed canal system. The RMA-2 model output was used to calibrate hydrodynamics in the QualTX model. Modeling of the subdivision was done to ensure adequate dissolved oxygen levels in the far reaches of the subdivision. Parameters included biochemical oxygen demand, tides, meteorological factors, benthic demand, surface water runoff, temperature, etc.

An erosion and sediment transport analysis was also performed to determine necessity for protection of dredged canals from infill. Littoral sediment transport was quantified at the project site based upon aerial photo time series and site data collection. Jetty protection of dredged canals was recommended and preliminary design information including length, height alignment and materials were provided. Recommended jetty layout was based upon analysis of a combination of factors including critical wave heights, storm surge, wind and littoral sedimentation.

Lake Granbury Canal Construction Specification Study – Lake Granbury, TX: Dr. Harkins is the project manager for a project for the Brazos River Authority (BRA) and Brown and Gay Engineers (BGE) to determine design guidelines for new recreational canals. Dr. Harkins has assisted in determining appropriate configurations of newly constructed canals based upon water quality aspects considering existing lake-wide conditions, orientation with respect to prevailing winds, cross-sectional and longitudinal geometry, circulation patterns and depth fluctuations.

Water Quality Modeling and Analysis, (Brazos River Authority) Lake Granbury, Texas, Dr. Harkins is the project manager for a water quality study for the Brazos River Authority on Lake Granbury. The project includes water quality data collection and analysis of nutrients, bacterial, dissolved oxygen, pH and temperature as well as determination of important circulation patterns. EC will recommend the type of models to be developed to analyze water quality parameters of interest. Dr. Harkins is responsible for the data evaluation, model selection, development and utilization. EC will develop recommendations for best management practices or regionalization of wastewater collection to address water quality concerns in Lake Granbury.

Water Quality Permitting and Analysis, (Private Client) Lake Conroe, Texas, Dr. Harkins was the project manager for a wastewater facility that has applied to increase their permitted discharge amount. The application was contested and Dr. Harkins assisted in additional data collection and in modeling evaluations for the increased discharge into Lake Conroe. The application was granted once the protest was dropped.

Water Quality Permitting and Analysis, (Private Client) Dickenson Bayou, Texas, Dr. Harkins is the project manager for a wastewater facility that has applied to discharge their domestic wastewater into Gum Bayou. The application was contested and Dr. Harkins is currently assisting in additional data collection, model review, additional model development and evaluations.

Water Quality Modeling, (Private Developer) Port O'Connor, Texas, Dr. Harkins has completed a water quality study of a proposed subdivision located northwest of Port O' Connor, Texas. Modeling of the subdivision was done to ensure adequate dissolved oxygen levels in the far reaches of the subdivision. Parameters included biochemical oxygen demand, tides, meteorological factors, benthic demand, surface water runoff, temperature, etc.

Water Quality Modeling, (Private Developer) Seadrift, Texas, Dr. Harkins is currently a project manager for a water quality model of a proposed subdivision near Seadrift, Texas located along Espiritu Santo Bay. Initial data collection has been completed for model development including biochemical oxygen demand, tides, meteorological factors, benthic demand, surface water runoff, temperature, etc. Alternatives for subdivision design are underway with related water quality effects being addressed.

Water Quality Modeling of Dry Creek (Pate Engineering) – Fort Bend Co., Texas: Dr. Harkins assisted in the analysis and evaluation of a QualTX model developed by the Texas Commission on Environmental Quality (TCEQ) for Dry Creek in Montgomery County for a wastewater permit renewal. The analysis consisted of determining if the existing QualTX model was appropriate for the wastewater permit application. Sources of additional data were also investigated to further calibrate the QualTX model to existing conditions. Dr. Harkins assisted in performing numerous model simulations to determine if the additional wastewater effluent could be discharged into Dry Creek and still meet the required dissolved oxygen requirements downstream.

Assessment of Water Quality of Lake Livingston (Trinity River Authority) – Livingston, Texas: Dr. Harkins has participated in a water quality assessment of Lake Livingston. The assessment was conducted in cooperation with the TCEQ under authorization of the Clean Rivers Act. The assessment included collecting historic water quality data, a review of previous water quality studies conducted at Lake Livingston, an evaluation of the Lake Livingston water quality monitoring database, an assessment of historic and current water quality status and trends and an evaluation and review of the existing TRA monitoring and data management programs.

TMDL (Trinity River Authority) – Austin, Texas: Dr. Harkins Assisted in the analysis of current 303d listings for Trinity River Segment #0806A (Fosdic Lake), Segment #0829 (Lake Como), Segment #0803 (Lake Livingston) and Segment #0841 (Lower West Fork Trinity River) with respect to confirming or potentially delisting segments, and the data needs therefore.

Instream Flow Projects

Colorado River Instream Flow Analysis -- Colorado River, TX: Dr. Harkins is assisting the LCRA and BioWest, Inc., on the Colorado River Instream Flow Study to determine environmental needs. Dr. Harkins provided technical assistance for data collection efforts at ten sites on the Colorado River between Austin and Bay City. Data collected at each site included instream bathymetry (single-beam

echosounder), point velocity (ADV), current profiles (ADCP), water surface elevation (survey-grade differential GPS), water surface fluctuation (level gauges) and water edge (Laser rangefinder). This project is ongoing and Dr. Harkins is assisting in data interpretation, development of hydrodynamic models and integration of hydrodynamics with aquatic habitat.

Brazos River Instream Flow Reconnaissance Project – Waco, TX: This reconnaissance analysis was an important first step in future instream flow studies in the BRA study area. This analysis allowed the Brazos River Authority (BRA) in conjunction with the Texas Water Development Board (TWDB), the Texas Parks and Wildlife Department (TPWD), and the Texas Commission on Environmental Quality (TCEQ) to know what studies have been performed, what data has been collected and is available, and what information is needed in any portion of the study area. Dr. Harkins was the project manager and assisted the state agencies in the reconnaissance instream flow analysis in the Brazos River Basin. The objective of the study was to compile and organized existing historical information on the hydrology, biology, physical habitat, physical processes (geomorphology), and water quality in the Brazos River Basin from Lake Waco Dam to the Gulf of Mexico. Dr. Harkins assisted in the collection of data from existing reports/studies. Dr. Harkins also assisted in the development of a geo-referenced database cataloging all collected data and studies for future use in selecting instream flow study sites.

Geographic Information Systems (GIS) and Database

Dr. Harkins has used GIS for a variety of projects, including drainage area determinations, instream habitat evaluations, floodplain inundation studies, vegetation mapping, satellite imagery analysis and cartography. Dr. Harkins specializes in linking horizontal spatial information with vertical topographic data and temporal hydrological analyses.

Chris Stewart, AICP, CFM

Planning Manager

EDUCATION

- B.S., Architectural Studies, University of Texas at Austin, 1993
- M.S., Community and Regional Planning, University of Texas at Austin, 1997
- Additional Coursework in Urban Sociology, University of Karlsruhe, Germany, 1990-91

SOFTWARE PROFICIENCY

AutoCAD Land Development Desktop/Civil Design, AutoCAD Map, ArcGIS 9.2, ArcView 3.2, Microsoft Excel, KY Pipe2000, HEC-1, HEC-HMS, HEC-RAS, HEC-GeoRAS, HEC-GeoHMS, CRWR PrePro, Haestad FlowMaster

EXPERIENCE

Mr. Stewart is a Water Resources Planner with Espey Consultants, Inc. in Austin, Texas. Mr. Stewart has 11 years experience in municipal and development issues, including: urban planning, planning and zoning administration, architectural and urban design, economic development, land development, hydrologic and hydraulic analysis, and water resources planning. His services include: watershed master planning, urban design, concept planning, development feasibility studies, subdivision planning, site plan design, statistical analysis, hydrologic analysis, and water rights permitting. Mr. Stewart has expertise in integrating Geographic Information Systems (GIS) data with Computer-Aided Drafting and Design (CADD) data, to assist as design tools for engineering and planning. **His special expertise is in the formulation of public policy alternatives and funding mechanisms which stem from engineering data, method and analysis.**

Mr. Stewart has a broad experience base that touches across many disciplines and geographic locations. Representative project experience by area includes:

Municipal Planning

Comprehensive Plan, City of Cibolo: Mr. Stewart prepared an update to the 1995 Master Plan. A major component of the Plan is the Future Land Use Plan, and Mr. Stewart developed integrated parks, transportation, and central business district components to help the City develop its identity. Mr. Stewart developed the City's first spatially-referenced GIS datasets, consisting of parcels, floodplain, existing land use, future land use, zoning, creeks, floodplain, and future roads.

Development Review Services, City of Cibolo: Mr. Stewart is currently providing review assistance to the city to manage the volume of new development applications. These applications include subdivision, zoning, site plan, and public improvement projects.

SH 29 Expansion Community Impact Study, City of Liberty Hill: Faced with the possibility of right-of-way expansion through the heart of the community, Mr. Stewart directed a study to objectively determine the physical and fiscal impacts of three separate right-of-way alignments. The results enabled the City to determine a preferred alternative for inclusion in its Thoroughfare Master Plan.

Comprehensive Plan, City of Liberty Hill: Mr. Stewart assisted the City Council, Planning and Zoning Commission, and an Advisory Committee and in developing the City's first Comprehensive Plan. Elements of this plan include: a Baseline Analysis; Housing; Parks and Recreation; Economic Development; Future Land Use; and, Transportation. The City expects a tripling of its population to over

8,000 in the next twenty years. Mr. Stewart developed a topological data structure in AutoCAD Map to portray demographic and land use trends, and create the City's Future Land Use and Transportation Plan.

Commercial Design Standards, City of Cibolo: Mr. Stewart drafted the commercial design standards adopted by the City Council. The Council sought a set of standards that would balance the city's interest in establishing pedestrian-scaled buildings and the economic impacts of heightened regulation.

Unified Development Code, City of Liberty Hill: Mr. Stewart worked closely with community leaders and an Advisory Committee to forge the City's first set of development ordinances, in the form of a Unified Development Code. The UDC covers zoning, subdivision and site development requirements, as well as guidelines for enforcement and compliance.

Future Land Use Plan and Zoning Ordinance, City of Universal City: The City of Universal City began the process of rewriting the zoning ordinance with a retail market analysis. This analysis gave rise to a Future Land Use Plan, which guides the growth of the city's major retail corridor as a pattern of urban "nodes" and "paths". Following the adoption of this Plan, Mr. Stewart wrote a zoning ordinance designed to implement the plan.

FM 1431 Corridor Land Use Study, City of Jonestown: Mr. Stewart is currently working with the City of Jonestown to develop a series of alternative land use patterns along FM 1431. These land use scenarios are to be integrated with a municipal facilities plan and determinations of wastewater service requirements will also be made.

Water/Wastewater

Impact Fee Study and Water and Wastewater Master Plan, City of Cibolo: Mr. Stewart served as Project Manager for this impact fee study. He directed the existing system model development, demand pattern analysis, and Future Land Use Assumption process in conformance with the governing provisions for impact fees found in Chapter 395, Local Government Code. He developed the 10-year CIP, as required by law, and directed the cost estimation tasks and implementation program development.
Emergency Water Supply Strategies, City of Cibolo: Mr. Stewart developed future water demand projections for the City of Cibolo, based on a review of meter growth, historical use records, and the future land use assumptions developed in association with the Water Impact Fee Study. With these future demands quantified, Mr. Stewart is currently assisting the City of Cibolo in implementing additional water supply strategies from a combination of ground and surface water supply projects.

Water Resources

Hamilton Pool Rainfall Record Analysis: Mr. Stewart developed several statistical models to assess the incremental rainfall pattern of non-recording gage data taken at Hamilton Pool.

Springflow Augmentation at Comal Springs and San Marcos Springs: Working with a consultant team for the Edwards Aquifer Authority, Mr. Stewart conducted multiple springflow frequency analyses based on alternate pumping scenarios and species tolerance thresholds to arrive at a range of annual augmentation volumes and peak delivery requirements. These results form the basis for subsequent tasks of the project, including the identification of potential sources of augmentation water, design of a delivery system and operational guidelines, as well as cost estimates for implementation. This analysis required a multi-disciplinary understanding of hydrogeology, biology, water quality, water distribution hydraulics, and regulatory positions of multiple entities.

Joint Application for Firm Yield in Lake Houston: Based on initial results from the San Jacinto WAM, Mr. Stewart prepared a complete application for appropriation of 32,500 ac-ft of firm yield in Lake Houston for the San Jacinto River Authority and the City of Houston. Mr. Stewart served as a focal point for coordination between the entities, their respective legal staffs, and the TCEQ. At the same time, he was responsible for collection of supporting technical data, preparation of maps and exhibits utilizing available GIS data, and the compilation and distribution of the application.

Joint Application for Run-of-River Appropriation in Lake Houston: The WAM also indicated the availability of an additional 80,000 ac-ft of run-of-river right. Mr. Stewart prepared a complete joint application for SJRA and the City of Houston for this appropriation. Mr. Stewart assembled all supporting technical data, coordinated with each co-applicant and the TCEQ, prepared all maps and exhibits utilizing available GIS data, and compiled and distributed the application. The application achieved administratively complete status very quickly.

Application for Re-use of Groundwater-based Effluent and Bed-and-Banks Authorization: SJRA owns and operates three wastewater plants serving The Woodlands, for which it sought the right to reuse the treated effluent. As the TCEQ does not have an adopted application form for re-use appropriation requests, Mr. Stewart developed an application packet that addressed all requirements of TCEQ rules, leading to a very expedient determination of administrative completeness.

Industrial Water Conservation Plan (SJRA): Under 30 TAC §295.9, an application to appropriate public water for industrial use requires a current industrial water conservation plan to be on-file with TCEQ. In support of SJRA's re-use application, Mr. Stewart prepared an Industrial Water Conservation Plan in accordance with agency rules. Mr. Stewart formulated a survey for distribution to industrial customers in the service area, compiled the results, and coordinated with industrial customers and SJRA to ensure a complete, practical plan.

Application for Unappropriated Flow in the Lower San Jacinto River Basin (City of Houston): The results of the San Jacinto WAM also indicate an additional 160,000 ac-ft of run-of-river rights (not backed by storage) in the lower San Jacinto River basin, within the City of Houston's service area. While this volume bears lower reliabilities, it represents an important means for the City of Houston to continue its shift from groundwater resources to surface water, a very important regional objective. Mr. Stewart assisted in coordinating this application on the City's behalf, and prepared the full application for appropriation.

Application for Re-use (City of Houston): The City of Houston Wastewater Utility encompasses approximately 35 operating wastewater treatment plants, which return a significant amount of flow to the bayous of the city. Mr. Stewart worked first to determine which plants had the highest potential for re-use of the effluent, based on position in the watershed, position relative to the saltwater barrier, position relative to environmentally sensitive areas, and position relative to existing infrastructure. Once the plants were selected, Mr. Stewart prepared a complete application for submittal to TCEQ. Mr. Stewart coordinated closely with City of Houston staff, and utilized available GIS datasets to develop maps and exhibits.

CLCND Water Rights Amendment: SJRA purchased a portion of the Chambers-Liberty County Navigation District rights authorized under Certificate of Adjudication 08-4279. In order to consummate these new rights for use by SJRA, the right was amended to reflect a change in ownership, a change in use, enable an interbasin transfer, and add an additional point of diversion. Mr. Stewart coordinated with SJRA and TCEQ, and prepared a single application to handle these amendments.

Wayne K. Hunter, P.E.

DFW Branch Manager

EDUCATION

- BS, Civil Engineering, West Virginia University, 1981
- ME, Civil Engineering, University of Texas at Arlington, 1991

ACTIVE REGISTRATIONS

- Texas Professional Engineer #65325

EXPERIENCE

Prior to joining Espey Consultants, Inc., Mr. Hunter completed the following assignments:

Management Roles within Trinity River Authority of Texas in study and design project management: Served as Manager of Development and Assistant Regional Manager, Northern Region, and managed portions or all of the performance of several alternative water supply studies including the following:

- Regional Water Supply Feasibility Study for Ellis County, which considered use of extended city of Dallas service, use of existing groundwater supplies, and consideration for use of trans-county transmission of Tarrant Regional Water District supplies form Richland Chambers and Cedar Creek reservoirs. The study resulted in the organizations development of a phased regional water supply system for Ellis County using new service form the TRWD pipelines;

- Various water quality analyses of Lake Arlington, water supply terminal storage for the TRA regional Tarrant County Water Supply Project and its receipt of TRWD East Texas water from Richland and Cedar creek reservoirs. Studies related to seasonal water quality variations resulting from organisms in the water source and changes in water quality due to TRWD operation of water supplies from multiple reservoirs

Principal-In-Chg. for Lake Chapman Water Supply Project - City of Irving, Texas: Directed a MWH program management team in the latter stages of design, procurement, and construction administration for a 40-mile, 72-inch diameter raw water delivery pipeline and pump station project to convey additional water supply to augment Dallas' supply to Irving. Project included first ever use of large diameter steel pipeline in north central Texas and $77Million construction contracts were completed with change orders less than 0.1%.

Project Director for Strategic Capital Requirements - Oklahoma City: Directed a MWH team for assessing water supply, water conveyance, water treatment and water distribution system capacities to meet existing and future populations through a 50 year planning horizon, inclusive of assessing the options for Oklahoma City's increased service to a growing number of cities and districts. The assessment included the effects of a dependable yield analysis on existing water supply and served to define a plan for achieving improved reliability in meeting future service levels in all four areas of the city's water utilities.

Project Director for Secondary Water Supply Project – Laredo, Texas: Managed a MWH project to evaluate alternative water supply sources to provide redundancy for Laredo's reliance on its sole source, the Rio Grande River. Project included assessment of thirteen alternative supply scenarios, concluding with interim use of a localized wellfield. Ultimately, wellfield testing determined wellfield would

produce less than published yields, resulting in a recommendation to abandon local wellfield and consider longer-term alternatives.

Since joining Espey Consultants, Inc., Mr. Hunter completed the following assignments:

Laredo Secondary Water Supply project 2005-2006- City of Laredo, Texas
Served as Project Manager for conceptual development of a design build approach for providing the City of Laredo with a sustainable alternative water supply not reliant on the Rio Grande River. Established the concept for a 20 MGD remote wellfield, expandable to 40 MGD in an adjacent county, Dimmitt County, a 72 mile 42, 45, and 54-inhc diameter transmission pipeline and pump station system to convey water to the cities system, and a concept for end of pipe stability adjustment, disinfection, and storage, prior to delivery of water to the city of Laredo's distribution system. The concept was developed with full financing, regulatory permitting, design, construction, and initial operation prior to transition to City forces. The EC led team was selected however the project was placed on hold pending resolution of issues regarding funding.

Critical Areas of Concern Segment CAC-11, 2008 (ongoing) – Trinity River Authority
Serving as Project Manager for assessment of 30 year old significantly deteriorated 96-inch diameter wastewater interceptor for condition adequacy in light of planned rehabilitation. The rehabilitation of this segment became viable when a 104-inch diameter segment was completed, allowing for the transfer of existing wastewater flows. Proposed methods for assessment include use of Redzone technology deployed through robot or remote controlled internal pipeline assessment tools, which will include CCTV, sonar and laser measurement of internal features. Project will conclude with the preparation of a preliminary engineering report in advance of design of the selected rehabilitation option by TRA.

TRA Northern Region Program Management, 2005 through 2008 – Trinity River Authority of Texas
As Program Manager, structured a Program Management assignment to assist the Trinity River Authority in the overall management of roughly $0.500 Billion in capital improvements (which in two years grew to $1.100 Billion) phased in over the next five years. Program efforts included:

- Development of a scheduling and project development controls for approximately 200 pipeline and treatment water and wastewater projects. Schedules included approximately 270 subtasks for successful delivery of a project, through preliminary design, land acquisition if needed, final design, advertisement for bids, construction administration and transfer to operations. These subtasks were then nested below 28 primary tasks that could be measured for each project on a monthly basis.
- Prioritized capital project sequencing to match funding availability and resources for design management to establish a program for design manager monthly updates to overall project schedules using Microsoft Project 2003.
- Directly managed the design for approximately 15 pipeline projects (cumulative length of approximately 106,000linear feet) with an approximate capital cost of $150 Million and size ranges from 24-inch diameter to 108-inch diameter pipe
- Developed elements of a program to establish the basis for alternative pipe type selection for large diameter pipe (larger than 30-inch diameter) considering features of alternative FRP products and the benefits for volume pricing.
- Led an internal team for establishing a continuous manhole rehabilitation program for application on an annual basis for a set number of manholes to be assessed, designated for rehabilitation type
- Authored the first version of the Design Manager Playbook that establishes required steps to be completed with each task of design management, the other work groups that each step must be coordinated with, and the definition of a completed step.
- Coordinated the design of Authority treatment plant process control standards.

- Prepared the Authority's 162 MGD Central Regional Wastewater System and the 57 MGD Tarrant County Water Supply project triennial treatment and conveyance system reviews for analysis of 2006 and 2007 human resource, operations, maintenance, regulatory, and capital planning for consideration of how these areas could be measured for effectiveness and determination of areas needing improvement
- Performed a levee operations analysis of the levee system surrounding the 162 MGD Central Regional Wastewater treatment plant, inclusive of hydraulic criteria and stability analysis, with assistance from a geotechnical firm.
- Coordinated the impacts from the washout of two areas containing large diameter wastewater pipelines, identifying a plan for improvements for long term integrity and potential funding sources for implementation
- Structured a program for development of design standards for Authority construction standards for use as common elements to construction contract documents.

Water and Sewer Cost of Service Study, 2006 – City of Lago Vista
Served as Project Manager for review of current rate structures for both water and sewer, evaluation of cost driven features not considered, and the development of a proposed true cost of service rate model for water and sewer service for its retail customers. Rate models developed were tested on near term historical years, adjusted, and then projected for future years for the city under growth and less growth options. Alternative phased rates were then developed to provide for reduced rate shock as the City adjusts to a true cost of service rate system.

River Authority Management Audit, 2007 – Trinity River Authority
Served as project manager for five-year assessment to assist TRA in meeting the requirements for a management and operations review. Organizational management review was conducted to assess organizational structure, roles of departments, and policies of the organization. A SWAT analysis was performed with key management groups resulting in the presentation of findings for TRA's submission to the State.

Feasibility Study for Mountain View Regional Wastewater System, 2006 – Trinity River Authority
Served as Task Manager for assessment of water quality impacts to the receiving streams for consideration of a new regional wastewater system versus expanding a water quality permit restricted existing 3.0 MGD wastewater treatment plant. Water quality modeling was performed to support multiple treatment discharge scenarios for varying flow and discharge parameters, concluding that an option existed to utilize a modified modeling approach resulting in an ultimate ten-fold increase allowable discharge for the existing treatment plant. Results were coordinated with TCEQ water quality staff to ensure adequacy of modeling assumptions.

Anti-Degradation Study for Jackson County, MS, 2008 – Carollo Engineers
Served as Task Manager in developing an approach to comply with the State of Mississippi's application of new standards for considering wastewater impacts to protected water segment uses. Project was intended to provide for regulatory acceptance of a proposed 1.5 MGD new discharge into the Jourdan River, proposed for design by Carollo Engineers. The assessment was prepared for Carollo Engineers presentation to MDEQ using the agencies recently developed new criteria for evaluating anti-degradation of a stream segment. Analysis was conducted for alternatives to the new discharge inclusive of use of surrounding systems, alternative no discharge options, and alterative discharge points.

Tim D. Osting, P.E.

Engineer

EDUCATION

- Master of Science in Engineering, Environmental and Water Resources Engineering, University of Texas at Austin, May 2007
- Bachelor of Science Degree in Civil Engineering, University of Texas at Austin, July 1998

PROFESSIONAL REGISTRATIONS

- Licensed Professional Engineer, Texas – No. 91931

TECHNICAL REPORTS, PUBLICATIONS AND CONFERENCE PRESENTATIONS

- Osting, T., Hodges, B., 2007, "Estimating uncertainty of 2D hydraulic models used for aquatic habitat modeling studies," University of Texas at Austin; Center for Research in Water Resources (UT-CRWR) Online Report 07-03.
- Osting, T., 2005, "Off-the-shelf analysis of overbank inundation in the Sulphur River Basin," 2005 Annual Conference on Importance of Geomorphology in Maintenance and Restoration of Stream Systems, Texas River and Reservoir Management Society.
- Osting, T., Mathews, R., Austin, B., 2004, "Analysis of Instream Flows for the Sulphur River – Hydrology, Hydraulics and Fish Habitat Utilization," Texas Water Development Board report to US Army Corps of Engineers, 383 pages.
- Osting, T, J Furnans, R Mathews, 2004, "Surface connectivity between six oxbow lakes and the Brazos River, Texas," Texas Water Development Board, Surface Water Resources Division, December 6, 2004.
- Osting, T., Mathews, R., Austin, B., 2004, "Analysis of Instream Flows for the Lower Brazos River – Hydrology, Hydraulics and Fish Habitat Utilization," Texas Water Development Board report to US Army Corps of Engineers, 272 pages.
- Chowdhury, A., Osting, T., Furnans, J., Mathews, R., 2005, "Groundwater-surface water interaction in the Brazos River Basin: Evidence from lake connection history, chemical and isotopic compositions," Texas Water Development Board Report (draft).
- White, L., Hodges, B., Austin, B., Osting, T, "Identification of submerged large woody debris from single-beam echo soundings," 2006, Journal of Hydroinfomatics 8(1):1-12.

EXPERIENCE

Mr. Tim Osting is a Project Manager and engineer in the water resources/environmental section of Espey Consultants, Inc., (EC) in Austin, TX. Mr. Osting has over ten years of experience in water resources analysis and environmental field study design in Texas. Mr. Osting has experience managing technical and professional personnel on multi-disciplinary projects as well as experience collaborating with state of Texas resource agencies and university researchers. Mr. Osting's recent work has been related to lake and coastal water quality, coastal processes, river hydraulics, instream flow analyses, bay and estuary inflow analyses. His specialties include multidimensional hydrodynamic modeling, hydrology, river-floodplain interaction, GIS analysis and hydrographic field studies utilizing state-of-the-art, high-resolution data collection equipment. Mr. Osting has successfully designed and implemented complex, multi-agency, multi-year data collection programs in Texas streams and estuaries.

San Jacinto River Authority Instream Flow Reconnaissance Database and Literature Review – San Jacinto River, TX: Mr. Osting is project manager responsible for development of a comprehensive database and hydrological analysis related to instream flow in the San Jacinto River basin. The project involves development of a comprehensive repository including annotated bibliographies, GIS datasets and

databases to catalogue existing knowledge into topical areas including biology, geomorphology, hydrology, hydraulics and water quality. Hydrological analysis will also be conducted using Lyons Method, Indicators of Hydrologic Alteration (IHA) or other statistical tools appropriate for analyzing flow regime. These results of this project will be used as basis for design comprehensive instream flow studies in the future.

Sulphur River Instream Flow Analysis -- Sulphur River, TX: Working at the TWDB, Mr. Osting managed a US Army Corps of Engineers contract for instream flow studies on the Sulphur River through 2004. The purpose of the project was to conduct studies that would be used to determine the effect of proposed Mervin Nichols reservoir projects in the basin. Mr. Osting conducted field work (similar to that described in Colorado River project above) at two sites, completed hydrodynamic models and managed a project summarizing hydrological, hydraulic and fish habitat work conducted to-date. Mr. Osting coordinated statistical analysis of aquatic habitat and fish abundance data from channelized and unchannelized sites with biologists at Texas Water Development Board (TWDB) and Texas A&M University (TAMU) and integrated that data with hydraulic model output within a GIS framework. Interaction between the river and its bottomland hardwood flood plain was analyzed (see below).

Sulphur River Floodplain Inundation Analysis – Sulphur River, TX: In conjunction with the Sulphur River Instream Flow Analysis pertaining to the Mervin Nichols reservoir project, Mr. Osting conducted a GIS analysis to determine the interval and duration of inundation in bottomland flood plain of the Sulphur River basin. Rasterized vegetation maps derived from satellite imagery by Texas Parks and Wildlife Department were used to quantify the area of each vegetation type (bottomland hardwood, bottomland hardwood swamp, oak/hickory forest, pasture, etc.) that was inundated. The area (hectares) was determined for each of six small flood flows that ranged in recurrence interval from six months to two years. The analysis was conducted using off-the-shelf, publicly-available GIS data (DEM topography, USGS gaging station water surface elevations, HUC watersheds, LANDSAT satellite imagery) and a small amount of existing site-specific field data; the analysis was validated using a small amount of on-site field data.

Caddo Lake Watershed Protection Plan – Jefferson, TX: Related to the Watershed Protection Plan (WPP) for Cypress Basin and Caddo Lake sponsored by the North East Texas Municipal Water District (NETMWD), the TCEQ and US EPA, Mr. Osting participated in scoping of a comprehensive data analysis and evaluation project leading to recommendations related to water quality modeling and data gaps. Mr. Osting will also serve in a capacity to relate water quality components to instream flow building blocks.

Colorado River Instream Flow Analysis -- Colorado River, TX: Mr. Osting is working with the LCRA and BioWest, Inc., on the Colorado River Instream Flow Study to determine environmental needs. Mr. Osting conducted field work and provided technical assistance for data collection efforts at ten sites on the Colorado River between Austin and Bay City. Data collected at each site included instream bathymetry (single-beam echosounder), point velocity (ADV), current profiles (ADCP), water surface elevation (survey-grade differential GPS), water surface fluctuation (level gauges) and water edge (Laser rangefinder). Mr. Osting participated in all phases of the project with concentration on data interpretation, development of hydrodynamic models and integration of hydrodynamics with aquatic habitat. Mr. Osting participated in development of flow regime recommendations that maintain health of the river ecosystem.

San Antonio River Instream Flow Planning Project – San Antonio River, TX: Mr. Osting is working with the San Antonio River Authority (SARA) and BioWest, Inc., on the San Antonio River Instream Flow Planning Project to determine environmental needs. This work is ongoing and Mr. Osting is tasked with data interpretation, development of hydraulic models and integration of hydraulics with aquatic

habitat. Mr. Osting will participate in developing flow regime recommendations that maintain health of the river ecosystem.

Brazos River/Allens Creek Instream Flow Analysis -- Brazos River, TX: Working at the Texas Water Development Board (TWDB), Mr. Osting managed a US Army Corps of Engineers contract for instream flow studies on the Brazos River through 2004. The purpose of the project was to conduct studies that would be used to determine the effect of the permitted Allens Creek Reservoir project on the Brazos River and on salinity migration in the estuary. Mr. Osting conducted field work (similar to that described in Colorado River project above) at two sites, completed hydrodynamic models and managed a project summarizing hydrological, hydraulic and fish habitat work conducted to-date. Mr. Osting coordinated statistical analysis of aquatic habitat and fish abundance data with biologists at TWDB and Texas A&M University (TAMU) and integrated that data with hydraulic model output within a GIS framework.

Matagorda Bay Health Evaluation, Marsh Habitat Analysis – Matagorda Bay, TX: Mr. Osting is responsible for design and programming of automated tools to evaluate and utilize hydrodynamic and salinity model output for the Marsh Habitat Analysis. The tool integrates model output, habitat mapping, salinity suitability and habitat suitability to provide insight into suitability of marsh conditions for a variety of species for a variety of scenarios. Mr. Osting is also responsible for troubleshooting and QA/QC hydrodynamic and water quality model simulations (RMA-2, RMA-4). Mr. Osting and other EC staff performed extensive uncertainty analysis on the habitat model and results of habitat model.

Matagorda Bay Health Evaluation, Bay Salinity Analysis – Matagorda Bay, TX: As part of development of freshwater inflow criteria for Matagorda Bay, Mr. Osting was responsible for an extensive analysis of salinity gradients and trends in the eastern arm of west Matagorda Bay. The analysis included comparison of salinity time-series sonde observation data, point observation data and model predictions (RMA-2 and RMA-4). Relationships between salinity and freshwater inflow from the Colorado River were developed and evaluated. The ultimate use of the analysis was to develop and increase confidence in bay environmental inflow criteria.

Lower Brazos River Salinity Monitoring Project – Brazoria County, TX: As part of a USACE-funded effort to evaluate movement of salinity from the Gulf of Mexico upstream into the Brazos River, the Texas Water Development Board (TWDB) and Brazos River Authority (BRA) awarded a one-year contract to Espey Consultants, Inc., (EC) to monitor salinity in a 30-mile reach of the Brazos River. Starting in August 2008, EC will install and maintain conductivity, temperature and depth sensors throughout the reach at multiple depths to monitor movement of the salinity prism.

Highlands Reservoir Hydrographic Survey – Highlands, TX: As part of a system-wide canal and water supply evaluation conducted by Espey Consultants, Inc., for the San Jacinto River Authority, Mr. Osting was responsible for hydrographic/volumetric survey of Highlands Reservoir, a 600 surface acre water impoundment. Depths were determined along transect lines using a boat-mounted single-beam echo-sounder linked to a sub-meter GPS. Temporary water level meters were installed for the duration of the survey to monitor water surface elevation; surveyed depths were converted to elevation using the water level time-series. Spikes were filtered from the bathymetry dataset using custom software and water boundary lines were digitized from high-resolution aerial photography (NAIP). Volume was determined using 3D Analyst in ESRI ArcGIS.

Lake Granbury Canal Circulation Studies – Granbury, TX: EC was contracted by the Brazos River Authority to conduct water quality modeling and analysis associated with the Watershed Protection Plan for Lake Granbury. As part of the canal modeling effort, the exchange of lake water with canal water was important. To estimate how exchange differed among different canals having different configurations, a circulation study was conducted. Rhodamine WT dye was deployed into six canal systems then the dye

plume was tracked using a flourometer and GPS system over the following 36 to 48 hours. On-site wind and environmental data was collected for the duration of the study. The dye tracks were used to estimate a combined dispersion/diffusion coefficient for each canal system.

Lake Granbury Watershed Protection Plan – Lake Granbury, TX: Mr. Osting is EC's project lead for water quality modeling to support the ongoing Watershed Protection Plan managed by the Brazos River Authority, sponsored by TCEQ and EPA. The project includes water quality data collection and analysis of nutrients, bacterial, dissolved oxygen, pH and temperature as well as determination of important circulation patterns. Mr. Osting is responsible for the data evaluation, model selection, development and utilization. EC recommended the type of models to be developed that will analyze water quality parameters of interest. EC will develop recommendations for best management practices or regionalization of wastewater collection to address water quality concerns in Lake Granbury.

Lake Granbury Canal Construction Specification Study, WQ Modeling – Lake Granbury, TX: Mr. Osting is working with the Brazos River Authority (BRA) and Brown and Gay Engineers (BGE) to determine appropriate geometric configurations for new residential canals. Mr. Osting is determining appropriate configurations based upon water quality aspects considering existing lake-wide conditions, orientation with respect to prevailing winds, cross-sectional and longitudinal geometry, circulation patterns and depth fluctuations. The EFDC hydrodynamic model, combined with the WASP water quality model were used to evaluate a matrix of geometric configurations based upon flushing time and Dissolved Oxygen concentration. Canal widths, depths, lengths, configuration and orientation were recommended on the basis of this water quality modeling effort.

General Sediment experience – Relating specifically to sediment accumulation and erosion control, Mr. Osting has determined sediment loading rates, sized sediment capture structures and designed outlet works for numerous small and large construction projects; he was responsible for site inspections to ensure adequate construction and operation of these structures during storm events. Mr. Osting has performed watershed-scale rainfall-runoff analyses to determine peak flow rates for typical and extreme rainfall events. Mr. Osting identified areas that were particularly susceptible to erosion and designed measures to prevent transport of sediment offsite.

Brazos River Oxbow study – Brazos River, TX: While at the TWDB, Mr. Osting designed and managed a surface hydrology field study to determine interaction of the Brazos River with six oxbow lakes located adjacent to the Brazos River channel between Bryan, TX, and Lake Jackson, TX. To augment this study, Mr. Osting collected water chemistry and isotope samples that were analyzed at TWDB to determine groundwater (alluvial aquifer) and surface water (river and oxbow) interaction. These two TWDB studies complemented research conducted simultaneously by Dr. Kirk Winemiller at TAMU to determine the effect of the oxbow lakes to fish assemblages. Mr. Osting's study determined the elevation, flow rate, recurrence interval and seasonal occurrence at which the Brazos River overflowed into each oxbow lake.

While employed by the Texas Water Development Board (TWDB), Mr. Osting was contract manager responsible for development and management of scopes of work to assemble a literature and data relevant to pending instream flow studies in the Brazos, Sabine and San Antonio River basins. Mr. Osting worked with subcontractors Texas Parks and Wildlife Department (TPWD), Brazos River Authority, Espey Consultants, Inc., Sabine River Authority and San Antonio River Authority to develop comprehensive annotated bibliographies, GIS datasets and databases to catalogue existing knowledge into topical areas including biology, geomorphology, hydrology, hydraulics and water quality. These databases will be used as basis for design comprehensive instream flow studies in the future.

Alisa L. Patterson, P.E.

Project Engineer

EDUCATION

- B.S. Environmental Engineering, Texas Tech University, 1999
- M.S. Environmental Engineering, Texas Tech University, 1999

PROFESSIONAL REGISTRATIONS

- Texas State Board of Professional Engineers – Professional Engineer No. 93787

FIELDS OF EXPERIENCE

Mrs. Alisa Patterson is a project engineer in the water resources/environmental section of Espey Consultants, Inc., (EC) in Austin, Texas. Mrs. Patterson has gained experience in water resources engineering planning design and planning including water availability modeling. She is knowledgeable in a variety of software packages including: ArcView/ArcInfo, ArcView SWAT, WRAP, HEC1, StormCAD, WaterCAD, MODFLOW, and Microsoft Office. Mrs. Patterson has participated in the surface water availability modeling (WAM) for the TCEQ in 7 of the 23 major river basins in Texas, including river basin models for the Trinity, Cypress, Red, Canadian, Rio Grande, Nueces-Rio Grande, and San Antonio-Nueces River Basins.

Reconnaissance Instream Flow Analysis – Brazos River Basin, Texas: EC performed a reconnaissance instream flow analysis in the Brazos River Basin for the Brazos River Authority, the Texas Water Development Board, the Texas Parks and Wildlife Department, and the Texas Commission on Environmental Quality. The objective of the study was to compile and organized existing historical information on the hydrology, biology, physical habitat, physical processes (geomorphology), and water quality in the Brazos River Basin from Lake Waco Dam to the Gulf of Mexico. Mrs. Patterson performed a literature review of existing reports/studies which included information on hydrology, biology, physical habitat, physical processes, and water quality in the Brazos River Basin downstream of Lake Waco. Information collected as part of the literature review was organized into an Access database to include the report/study title, publication date, author, report location and ID number, study start and end date, the type of data or information contained in the report, and an annotated bibliography created for each report. In addition, Mrs. Patterson collected water quality data from the TCEQ Surface Water Quality Monitoring (SWQM) program for the study area. Mrs. Patterson then created a spatial representation in GIS of the information gathered in the Access database along with the SWQM data.

Reconnaissance Instream Flow Analysis – San Jacinto River Basin, Texas: EC performed a reconnaissance instream flow analysis in the San Jacinto Basin for the Texas Water Development Board, the Texas Parks and Wildlife Department, and the Texas Commission on Environmental Quality. The objective of the study was to compile and organized existing historical information on the hydrology, biology, physical habitat, physical processes (geomorphology), and water quality in the San Jacinto River Basin. Mrs. Patterson performed a literature review of existing reports/studies which included information on hydrology, biology, physical habitat, physical processes, and water quality for the San Jacinto River Basin. Ms. Patterson will include information collected as part of the literature review in an Access database. The database will contain the report/study title, publication date, author, report location and ID number, study start and end date, the type of data or information contained in the report, and an annotated bibliography created for each report. A spatial representation of the reports collected as part of the literature review will be created in GIS.

Water Quality Analysis, Trinity River and Lake Houston - Trinity River Basin and San Jacinto River Basin: Mrs. Patterson is a project engineer for a project to assess the impact of Trinity River water

entering Lake Houston through Luce Bayou. The project is a proposed interbasin transfer of up to 400,000 ac-ft/yr of water from the Trinity River Basin. The Trinity River water has a better water quality than that of Lake Houston. Mrs. Patterson was involved in a literature review of previous studies, the collection and analysis of water quality data in the Trinity and San Jacinto River Basins, development of a water quality database, water quality impact analysis, treatability of the combine water sources and evaluation of environmental impacts. The additional water supply into Lake Houston would provide water for Harris County in the future.

Water Quality Assessment and Evaluation for Lake Palestine, Cedar Creek Reservoir, Richland Chambers Reservoir, Benbrook Lake, and Joe Pool Lake – Trinity River Basin and Neches River Basin, Texas: Mrs. Patterson is a project engineer for a water quality assessment and evaluation for the City of Dallas and Tarrant Regional Water District. The project is a proposed interbasin transfer of water to the Trinity River Basin from Lake Palestine. This project involved collection and analysis of water quality data in five reservoirs, development of a water quality database, water quality impact analysis, treatability of the combine water sources and evaluation of environmental impacts. Mrs. Patterson will be responsible for developing mass balance evaluations of the reservoirs based on different pipeline alternatives and varying storage conditions.

Trinity River Water Availability Modeling (WAM) – Trinity River Basin, Texas: Assisted in the development of the Water Availability Model for the Trinity, San Jacinto, Trinity-San Jacinto, and Neches-Trinity River Basins for Texas Commission on Environmental Quality (TCEQ). Mrs. Patterson provided technical support to the Center for Water Resources (CRWR) at the University of Texas, as well as, QA/QC for watershed parameters generated from the GIS coverages. Mrs. Patterson also assisted TCEQ with an update to the original Trinity River WAM in April 2002. This effort included the review of multiple water rights, recommendations of modeling assumptions for complex water rights and special conditions in the WAM, and providing a GIS coverage of the new water rights. In addition, Mrs. Patterson created the modeling input to model the subordination of Lake Livingston in the WAM for the Trinity River Basin.

Evaluation of Trinity Reuse Projects – Trinity River Basin, Texas: Mrs. Patterson has participated in the evaluation of Trinity Reuse Projects (2002-present), performing a hydrologic evaluation of reuse projects in the Trinity River Basin. This included the assessment of several of the conservative assumptions used in the initial modeling effort to determine if the assumptions used were too conservative. Mrs. Patterson created the finalized "base model" for all additional modeling scenarios, utilizing the Trinity River Basin WAM. Mrs. Patterson then used the new "base model" to evaluate differing alternatives for the reuse projects in the Trinity River Basin. The "base model" was also used to evaluate freshwater inflows into Galveston Bay from the Trinity River. Mrs. Patterson assisted in the development of WRAP input files to evaluate several freshwater inflow simulations using MaxH, MinQ and 7Q2 release requirements placed on Lake Livingston. Different modeling scenarios were created to determine how the freshwater inflows would affect the water availability in the Trinity Basin and the yield of Lake Livingston.

System Operations Permit – Waco, Texas: As part of a subcontract with Freese and Nichols, Inc., Mrs. Patterson assisted the Brazos River Authority (BRA) in the development of a system operations permit for the Brazos River Basin. The system operations permit will allow the BRA to have the flexibility to utilize the reservoirs in which it has storage and water rights as a system to be able to meet demands throughout the basin and create additional yield in the system. Mrs. Patterson also assisted in the modification of the Brazos WAM to incorporate a methodology for modeling the system operation permit. Based on the Lyon's and Consensus methods, Mrs. Patterson developed the environmental flow restrictions for the system operations permit. Mrs. Patterson input these flow restrictions into the model and evaluated the impact to total firm yield of the system. Additionally, Mrs. Patterson also assisted in

the development and application of other simulations such as 75/75 criteria and firm yield at different diversion points in the basin. Mrs. Patterson assisted in creating the water right application and supporting documents as well as reviewing the drought contingency plan and water conservation plan.

Conjunctive Use Analysis – Waco, Texas: As part of a subcontract with Parsons Brinkerhoff, Mrs. Patterson is currently assisting the Brazos River Authority (BRA) with a conjunctive use analysis. Mrs. Patterson utilized the current Brazos River Basin WAM from TCEQ to determine the firm yield of Lake. The analysis consisted of evaluating the firm yield of Lake Granger under different sedimentation conditions with and without the conjunctive use of groundwater.

Red and Canadian River Water Availability Modeling (WAM) – Red and Canadian River Basin, Texas: TCEQ. Mrs. Patterson's primary responsibilities included assistance in the development of the Project Management Plan, Detailed Workplan, Naturalized Flow Report, and the Final Water Availability Model Report. Mrs. Patterson assisted in creating the methodology for estimating naturalized flows in the Red and Canadian River Basins, the collection of data, and generation of naturalized flows. Mrs. Patterson assisted in obtaining historical diversion and return flow data for the river basins, dividing the data by primary control point (or subwatershed), and collecting and analyzing the reservoir area capacity data and reservoir operations within the Red and Canadian River Basins. In addition, she assisted the CRWR at the University of Texas and TCEQ in the location of all control point, return flow, and water right locations in the GIS coverage used in the modeling effort. Mrs. Patterson also provided QA/QC for watershed parameters generated from the GIS coverages by CRWR. Mrs. Patterson developed the input files for the water availability model used in this study, Water Rights Analysis Package (WRAP). The Red River Compact between Texas, Oklahoma, Arkansas, and Louisiana was evaluated and included into the Red River Basin model. The Canadian River Compact was evaluated and included in the Canadian River Basin model. Mrs. Patterson also completed the WRAP simulations for the Red and Canadian River Basins.

Cypress River Water Availability Modeling (WAM) – Cypress River Basin, Texas: TCEQ. Mrs. Patterson provided QA/QC for GIS coverage's and watershed parameters produced by TCEQ and the CRWR at the University of Texas. Mrs. Patterson also assisted in the development of the WRAP input files and the basin simulations.

San Antonio/Nueces-Nueces/Rio Grande Water Availability Model (WAM) – San Antonio/Nueces-Nueces/Rio Grande River Basin, Texas: TCEQ. Mrs. Patterson assisted in the collection and analysis of data in GIS format that was used to estimate runoff in the coastal river basins. The runoff was used as naturalized flows for the water availability modeling effort to produce water reliabilities for individual water right holders in the basins. She assisted the CRWR at the University of Texas and TCEQ in the location of all control point, return flow, and water right locations in the GIS coverage used in the modeling effort. Mrs. Patterson also provided QA/QC for watershed parameters generated from the GIS coverages by CRWR. Mrs. Patterson assisted in the development of the WRAP input files and the basin simulations.

Rio Grande Water Availability Model (WAM) – Rio Grand River Basin, Texas and New Mexico: The Rio Grande River Basin WAM is the last of river basin WAMs to be developed for TCEQ. Mrs. Patterson's responsibilities primarily revolved around modeling the Mexico portion of the Rio Grande; however, she also participated in several aspects in the development of the Texas portion of the Rio Grande WAM. Mrs. Patterson analyzed the water use in the Mexico portion of the basin and identified any issues or problems that needed to be addressed for the modeling effort. Afterwards, Mrs. Patterson developed modeling methodologies and incorporated them into the WRAP water right input deck to represent water use in Mexico's Rio Grande River Basin. In addition, Mrs. Patterson also developed the spatial configuration of control points and the area capacity relationships for the major reservoirs in the

Mexico portion of the basin and incorporated them into the WRAP input deck. Using the individual water use records in Texas, Mrs. Patterson calculated the seasonal demand patterns for municipal, industrial, and irrigation uses in the Texas portion of the basin. Mrs. Patterson provided QA/QC for several aspects of the Rio Grande WAM including the review and evaluation of the Rio Grande WAM's WRAP input of reservoir evaporation, channel losses, and the modeling of individual water rights and review of the WAM output to evaluate WRAP's treatment of channel losses and diversions in the Rio Grande River Basin.

Oklahoma Firm Yield Analysis – Oklahoma: Mrs. Patterson was a project engineer for a project involving the review of firm yields of numerous reservoirs in Oklahoma. The firm yields estimates found in the Oklahoma Water Resources Board (OWRB) 1995 Water Plan, OWRB internal reservoir summary sheets and the U. S. Corp. or Engineers (USACE) firm yield summaries were analyzed and compared to determine discrepancies in firm yields between publications. As part of this project, Mrs. Patterson also determined the unappropriated firm yield for each of the reservoirs (that part of the firm yield that has not been permitted for water use). The reservoirs evaluated in this study were Canton Lake, Lake Overholser, Lake Hefner, McGee Creek Reservoir, Atoka Lake, Hugo Lake, Lake Sardis and Lake Stanley Draper. Mrs. Patterson collected water rights and historical water use information from OWRB staff members for each segment of the North Canadian, Canadian, Cimarron and Kiamichi Rivers.

Oklahoma City Reservoir System Firm Yield Evaluation – Oklahoma City, Oklahoma: As part of a subcontract with Montgomery Watson Harza (MWH), Mrs. Patterson recently completed a firm yield analysis for the reservoir system on the North Canadian River System. Mrs. Patterson created all model input for this project and was directly responsible for the development of the WRAP model used to simulate the system. Mrs. Patterson assisted Oklahoma City in determining the reliability of the existing water rights and to define additional water supplies that could be available to meet future regional water demands.

Pantex/BWXT Site-wide Ecological Risk Assessment (ERA), Amarillo, Texas. Mrs. Patterson is currently assisting in the sample collection of additional data required to support the ERA. Tasks include coordination with Pantex personnel, sampling, QA/QC and reporting requirements. Both surface water and sediment samples are being collected at five separate playas at approximately 18 sites per playa to represent potential points of exposure and biologically active zones.

Evaluation of Impact of Bifurcated Permitting Rules on Downstream Water Interests – Guadalupe-San Antonio River Basin, Texas: EC, as part of a subcontract with LBG-Guyton Associates, assisted the Edwards Aquifer Authority (EAA) with an evaluation of the impact of bifurcated (junior-senior) permitting rules on downstream surface water interests in the Guadalupe River Basin. EC assessed the flow of surface water and the management of surface water rights in the Guadalupe-San Antonio River Basin as it relates to the evaluation of different groundwater management scenarios for the Edwards Aquifer. Different pumping scenarios were developed in MODFLOW and GWSIM IV to represent historical pumpage, pumpage from junior and senior rights, and pumpage from only senior rights in the Edwards Aquifer. Mrs. Patterson incorporated the resulting springflow estimates into the Guadalupe-San Antonio WAM. Mrs. Patterson then determined the impact to downstream surface water rights under the different pumping scenarios.

Jack E. Stowe, Jr.
President

EDUCATION

- Bachelor of Arts in Accounting, North Texas State University, Denton, Texas, 1973

PUBLICATIONS AND CONFERENCE PRESENTATIONS

- "Rate Impact of Water Conservation Pricing", Texas Water Conservation Association, 1993
- "Alternative Funding for Capital Improvements", Water Environmental Association of Texas, 1994
- "Construction Management and Financing Alternatives", Water Environmental Association of Texas, 1994
- "Management Audits", Texas Water Conservation Association - Technical Seminar, 1994
- "Ins and Outs of Rate Making", American Association of Water Board Directors, 1995
- "SBI Deregulation 101",
- "Water Retail Wholesale Ratemaking", Texas Water Conservation Association – Technical Seminar, 2000
- "Electric Deregulation in Texas", Texas Chapter of the Public Works Association, 2000
- "Innovative Financing for Water and Wastewater Utilities", Texas Water Law Seminar, February 2002
- "Encroachment Issues: Your Service Area is Worth How Much?", Texas Rural Water Association Annual Conference, March 2002
- "Allocating the Cost of Population Growth in Wholesale Water Contracts", Texas Water Law Seminar, January 2007

EXPERIENCE

Mr. Stowe's public sector consulting career began in 1975. His career includes nine years in a "big-eight" public accounting and consulting firm where he held the title of Manager. After serving one and one-half years as Chief Financial Officer and Treasurer of an International Real Estate firm, Mr. Stowe founded Aries Resource Management as a consulting group dedicated to serving the Public Sector. In 1986 Aries Resource Management entered into a partnership agreement with Reed Municipal Services, Inc., to form Reed-Stowe & Co. In 1997, Reed-Stowe & Co. was purchased by Navigant, Inc. In 2000, Mr. Stowe reacquired his practice from Navigant and the Company was renamed Reed, Stowe & Yanke, LLC. In March 2003, Reed, Stowe & Yanke was acquired by R. W. Beck, Inc. In April 2008, Mr. Stowe founded J. Stowe & Co. and serves as the firm's President.

Mr. Stowe is a recognized expert with regards to the finance and management of utility systems. He has performed over 100 analytical studies for clients, including studies focusing on cost allocation, cost of service determination, and rate design. While his experience encompasses all forms of utility systems, the bulk of Mr. Stowe's work has been in the area of water and wastewater service.

Throughout his career, Mr. Stowe has conducted and/or supervised analyses of rate base, operating income, rate of return, revenue requirements, fully allocated cost of service, and rate design. In many instances, the results of these studies were summarized into expert testimony and presented in rate case proceedings at either the state and/or local jurisdictions. The various jurisdictions Mr. Stowe has performed consulting services in are as follows:

- Arizona Corporation Commission
- Illinois Commerce Commission

- Federal Energy Regulatory Commission
- Kentucky Public Service Commission
- Mississippi Public Service Commission
- New Mexico Public Service Commission
- Oklahoma Corporation Commission
- Public Utility Commission of Texas
- Railroad Commission of Texas
- Texas Commission on Environmental Quality
- Utah Public Service Commission
- Wyoming Public Service Commission

A partial listing of Texas clients for whom Mr. Stowe has conducted water and/or wastewater cost of service, customer class cost allocation, and/or rate design studies listed below:

- Arlington, Texas
- Bellaire, Texas
- Borger, Texas
- Celina, Texas
- Copperas Cove, Texas
- Corsicana, Texas
- Denton, Texas
- Farmers Branch, Texas
- Georgetown, Texas
- Gilmer, Texas
- Haltom City, Texas
- Kaufman, Texas
- Kilgore, Texas
- Knollwood, Texas
- Lewisville, Texas
- Lubbock, Texas
- Mesquite, Texas
- Midlothian, Texas
- North Richland Hills, Texas
- Paris, Texas
- Rowlett, Texas
- Sachse, Texas
- Sanger, Texas
- Terrell, Texas
- Tyler, Texas
- Waco, Texas
- Weatherford, Texas
- Wylie, Texas
- Texas Rural Water Association, 1999
- Texas Water Conservation Association, 1998

Chris Ekrut

Senior Consultant

EDUCATION

- Masters of Public Administration, University of North Texas
- Bachelor of Arts in Public Administration, West Texas A&M University
- Certified Associate of Project Management Candidate, Project Management Institute

PROFESSIONAL REGISTRATIONS

- Bachelor of Arts in Public Administration, West Texas A&M University, Canyon, Texas, 2003
- Masters of Public Administration, University of North Texas, Denton, Texas, 2005
- Certified Associated in Project Management (Candidate), Project Management Institute, Newtown Square, PA, Anticipate to Complete in 2009

EXPERIENCE

Mr. Ekrut joined J. Stowe & Co. as a Senior Consultant in May 2008. Prior to joining J. Stowe & Co., Mr. Ekrut was employed by R.W. Beck, Inc. as a Staff Consultant beginning in June 2005, after earning his Masters in Public Administration from the University of North Texas and graduating with honors. Prior to beginning his consulting career, Mr. Ekrut served as an intern for U.S. Congressman Larry Combest, Texas 19th District.

During his career, Mr. Ekrut has assisted in conducting a variety of engagements for water, wastewater, solid waste, electric, and natural gas utilities. The following presents a summary of Mr. Ekrut's experience to date.

Water and Wastewater Experience

- Assisted in conducting an Economic Impact and End User Impact Analysis for the Toledo Bend Water Supply Project, which proposes to supply at least 600,000 acre-feet of raw water to the DFW Metroplex
- Conducted a Top-Down Water Audit for the City of Gainesville, Texas
- Assisted the City of Arlington, Texas in conducting a Wholesale Water Sales Assessment Study.
- Assisted the Texas Water Development Board in conducting a Socioeconomic Analysis of Selected Interbasin Transfers in Texas
- Assisted the North Texas Municipal Water District in evaluating rate alternatives for its Member and Customer cities
- Retail and/or Wholesale Cost of Service and Rate Design Studies
- Possum Kingdom Water Supply Corporation
- City of Mexia, Texas
- City of Bellaire, Texas
- City of Cisco, Texas
- City of Glenn Heights, Texas
- City of Grapevine, Texas
- City of Aledo, Texas
- Development of Utility Business Plan
- City of Gainesville, Texas
- Town of Prosper, Texas
- Utility Service Area Valuations
- Portion of Algonquin Water Resources of America Service area for City of Tyler, Texas
- Portion of BHP Water Supply Corporation Service Area for Royse City, Texas

Litigation Support

- SOAH Docket Nos. 582-02-1652, 582-03-1820, 582-03-1821, & 582-03-1824 – Applications of McKinney, Melissa, and Anna and North Collin Water Supply Corporation to Amend CCN Nos. 10194, 11482, 12976, 11035 and Sewer CCN No. 20898 and of the City of Melissa to Obtain a Sewer CCN in Collin County
- SOAH Docket No. 582-065-1366 - The Woodcreek Ratepayers Coalition's Petition to Appeal the City of Woodcreek's Decision to Establish Water and Sewer Rates Charged by Aqua Texas, Inc.
- SOAH Docket No. 582-06-2023 – Application of the Town of Lindsay to Amend Water and Sewer Certificates of Convenience and Necessity (CCN) Nos. 13025 and 20927 in Cooke County, Texas Application Nos. 35096-C and 35097-C
- SOAH Docket No. 582-08-1341 – Application of Monarch Utilities to Change Water and Sewer Rates, Appeal of Monarch Utilities from Ratemaking Actions of Cities
- Management and Operations Reviews
- Lower Colorado River Authority's Water and Wastewater Utility Services Unit
- Brownsville Public Utilities Board
- Solid Waste Experience
- Assisted in conducting a Municipal Solid Waste Operations Study for the City of Denton, Texas
- Assisted in the conduct of an Alternative Feasibility Study for the City of Peoria, Arizona
- Assisted Siemens Energy and Environmental Services in conducting a detailed Waste Shed Analysis of the Dallas-Ft. Worth Metroplex in support of a new, environmental-friendly waste processing technology
- Assisted in conducting a Mixed Recycling Facility (MRF) Study for the North Central Texas Council of Governments

Electric Utility Experience

- Assisted Garland Power & Light in the conduct of an Asset Inventory and Assessment
- Assisted Garland Power & Light in filing their 2005 and 2006 Earnings Monitoring Report with the Public Utility Commission of Texas
- Assisted the City of Brenham, Texas in conducting an Electric Cost of Service and Rate Design Study and development of Power Cost Recovery Factor
- Assisted in conducting an Electric Cost of Service and Rate Design Study for the City of Lampasas, Texas

Gas Utility Experience

- Assisted the City of Brenham, Texas in analyzing and amending their Gas Cost Adjustment Factor
- Provided Litigation Support in Texas Railroad Commission Docket No. 9670 – Petition for De Novo Review of the Reduction of the Gas Utility Rates of ATMOS Energy Corp., Mid – Tex Division.

Program Management Experience

- Served as Project Controls Lead in Program Management of $41 million dollar wastewater facilities expansion program for the Waco Metropolitan Area Regional Sewer System (WMARSS).

Tracy A. Clinton, P.E.

Project Manager

EDUCATION

- Bachelor of Science, Civil Engineering

PROFESSIONAL REGISTRATION

- Professional Engineer Texas, Arizona, California

EXPERIENCE

Tracy Clinton is an expert in the areas of water recycling planning and public involvement/ decision analysis. She has managed or developed more than 30 water reuse plans for agencies across the country. She has also consulted on reuse efforts regarding endocrine disrupting compounds, disinfection alternatives, and filtration methods. Her reuse experience includes recycled water, grey water, and rainwater reuse. The public involvement and decision analysis specialties have proved useful when working with large stakeholder groups who are part of a decision process. Her experience includes:
Project manager for the Chino Basin Water Conservation District Strategic Plan, Montclair, California. Performed 10 interviews of service area agencies and developed of a strategic map and plan.

Project manager for the King County, Washington, Reuse Feasibility Report, Ch 4 "Regional Market Analysis." This chapter summarizes the reuse potential, stakeholder program, and reuse scenarios development, and briefly discusses costs and benefits.

Project manger for the regional South San Francisco/San Bruno/Brisbane Water Reuse Feasibility Study. Besides SSF, SB, and Brisbane, other study partners included the San Francisco Public Utilities Commission and Cal-Water Company. The study included identification and quantification of potential customers, conceptual development and costing of over a dozen alternatives, stakeholder involvement workshops, and financial alternatives.

Project manager for the Santa Clara Valley Water District's (SCVWD) and South County Regional Wastewater Authority's South County Recycled Water Master Plan. SCVWD wishes to maximize reuse in the County to offset groundwater use. The plan consists of a market assessment, distribution facilities evaluation and screening, planning-level hydraulic modeling, and preliminary costs and environmental services. The potential customers were contacted and site retrofits identified.

Project engineer for the City of Stockton, California Recycled Water Market Evaluation Study. Under this project a wide range of reclamation alternatives were evaluated for both reducing Stockton's treated wastewater discharge to the San Joaquin River and enhancing Stockton's water supply resources. Alternatives included blending reclaimed water with fresh surface water; supplying the water to irrigation districts for agricultural use; groundwater recharge; and community based irrigation and industrial water reuse. The study includes a cost analysis and an economic evaluation of primary, indirect and induced benefits of water recycling for each viable alternative.

Victoria Richards Harkins, Ph.D., P.E.

President

EDUCATION

- B.A. Biochemistry, Texas Tech University, 1992
- M.S. Civil Engineering, Texas Tech University, 1995
- Ph.D. Civil Engineering, Texas Tech University, 1998

PROFESSIONAL/TECHNICAL AFFILIATIONS

- Texas State Board of Professional Engineers – Professional Engineer No. 87733
- Oklahoma State Board of Professional Engineers – Professional Engineer No. 20957
- Member of American Society of Engineers

EXPERIENCE

Dr. Victoria Richards Harkins is currently a private engineering consultant in Austin, Texas. Dr. Harkins provides project management and engineering services for small, private, and multi-million dollar projects which included water and wastewater engineering, environmental engineering including water quality and soil contamination and remediation, and general civil engineering projects. Prior, Dr. Harkins was Team Leader for the Utility Certification and Rate Analysis team of the Water Supply Division of the Texas Commission on Environmental Quality. Dr. Harkins served as the state's expert resource for water and sewer utility service issues which included the Committee on Natural Resources of the State of Texas House of Representatives and many legislative contacts. Dr. Harkins testified as the state's witness on numerous occasions.

Engineer V, Texas Commission on Environmental Quality (TCEQ), Austin, Texas: Dr. Harkins was a senior engineer for the Water Supply Division of the TCEQ. Dr. Harkins' team processed over 300 certification applications a year and over 75 ratemaking applications per year.

Water and Wastewater Service Extension Policy, Austin, Texas: Dr. Harkins made an in depth review of a water and wastewater supply corporation service extension policy with reference to the applicable rules and regulations of the TCEQ and made recommendations for changes and/or improvements.

Water Quality Assessment and Remediation, Hays Co., Texas: Dr. Harkins was the project manager for a natural pond remediation due to point and non-point source pollution upstream. The project contains many sensitive biological and ecological factors. Remediation encompassed a pump and treat system with careful return of treated water. Project assessment included a detailed assessment of the current water quality, nutrient loadings from sediments (in the pool and upstream), background concentrations, and comparable water quality concentrations. Remediation activities began in October 2007 and were successfully completed in December 2007.

Water Quality Assessment and Remediation, Hamilton Pool, Travis Co., Texas (Travis County): Dr. Harkins is the project manager for a natural reservoir/pond and stream remediation project for Travis County. EC was retained by Travis County in August 2007 for assess the condition of the reservoir after significant sedimentation caused by upstream development. The project contains many sensitive biological and ecological factors. A detailed project assessment is currently underway with remediation alternatives being analyzed.

Water Quality Evaluation for Long Branch Creek, Hays, Co. Texas - Dr. Harkins performed an evaluation of water quality concerns in Long Branch (LB) creek and the potential contributing parties.

The purpose of the evaluation was to determine the existing water quality of Long Branch Creek and the status of the receiving stream. Construction activities upstream of the stream resulted in the accumulation of sediment including fine sediment along the receiving stream. Remediation alternatives are under design.

2007 Water Quality Pond Assessment and Wastewater Reuse, Austin, Texas: Dr. Harkins served as field manager for a project to assess the applicability of using treated wastewater effluent as make-up water for a stormwater quality pond/detention pond. An extensive literature review was completed and field analysis and prototype studies were scoped. Field studies were designed to test the pond's ability to treat the potentially higher levels of nutrients and other potential contaminants.

Environmental Site Assessment, Vista and Encantada, Llano County, Texas: Dr Harkins was a project manager for a surface water pond water quality investigation for potential herbicide, pesticide, and other potential contaminants of concern as part of a due diligence for a property transfer.

LCRA SAWS Water Supply Project - Matagorda Bay Health Study, Austin, Texas: Dr. Harkins is task leader for data inventory, acquisition, evaluation and management of physical, chemical, hydrological, biological data for the Matagorda Bay and all the connecting minor bays. An extensive literature review is currently underway. Dr. Harkins assisted with development of an extensive database management system. Data has been evaluated for its period of record, quality, format, and accessibility. Dr. Harkins is responsible for coordination between teams and state agencies. Data will be utilized for modeling efforts related to water withdrawals and addition within the river basin.

Lower Colorado River Authority, Burnet County, Texas: Dr. Harkins served as the project manager of a groundwater well design, installation and development project for a public water supply. In addition, the project involved a study of the localized groundwater to assess the potential for development of additional ground water supplies and the feasibility of obtaining service from a neighboring utility.

Water Distribution Modeling, Bexar Metropolitan Water District, San Antonio, Texas, Dr Harkins is currently project manager for water distribution modeling for a large water purveyor in the San Antonio, Central Texas area. Dr. Harkins is responsible for preparing computer hydraulic models for its water distribution system and to perform an evaluation of the distribution system to identify current and future needed improvements. Dr. Harkins has obtained, evaluated and reviewed existing data and facilities, allocated demand based upon (evaluate billings for 2005/2006 and input those demands at the closest modeling nodes) and input of demands, and input of system operations. Currently the model is being verified for calibration including field verification of C-factors, pipe layout, valve location, etc., Future work will include evaluation of the future water system, development of a CIP, and evaluation of financial impacts and methodologies.

Water Quality Modeling of Lake Dunlap (New Braunfels Utilities), New Braunfels, Texas: Dr. Harkins is currently the project manager for EC for New Braunfels Utilities (NBU) to conduct an eighteen month water quality sampling project. The scope of the project is to collect surface water samples in order to obtain information to assist in determining whether nutrient limitations on point source discharges from NBU's wastewater treatment plants (WWTPs) will prevent the growth of excessive aquatic vegetation in receiving waters, as provided by the Texas Commission on Environmental Quality (TCEQ) regulations at 30 TAC 307.4(e). As part of the water quality study numerous water quality studies related to point and non-point source loadings entering Lake Dunlap from the Comal and Guadalupe were evaluated to determine the impact of point and non-point source nutrient loadings on Lake Dunlap.

Water Quality Modeling, The Tidelands, Port O'Connor, Texas, Dr. Harkins completed a water quality study of a proposed subdivision located northwest of Port O' Connor, Texas. Modeling of the subdivision was done to ensure adequate dissolved oxygen levels in the far reaches of the subdivision. Parameters included sediment oxygen demand, aerations, dispersion, biochemical oxygen demand, tides, meteorological factors, surface water runoff, temperature, etc.

Water Quality Modeling, Beachside Development, Seadrift, Texas, Dr. Harkins completed a water quality study of a proposed subdivision located along San Antonio Bay, Texas. Modeling of the subdivision was done to ensure adequate dissolved oxygen levels in the far reaches of the subdivision. Parameters included biochemical oxygen demand, tides, meteorological factors, benthic demand, surface water runoff, temperature, etc.

Water Quality Modeling, The Sanctuary, Port O'Connor, Texas, Dr. Harkins completed a water quality study of a proposed subdivision located along Matagorda Bay, Texas. Modeling of the subdivision was done to ensure adequate dissolved oxygen levels in the far reaches of the subdivision. Parameters included biochemical oxygen demand, tides, meteorological factors, benthic demand, surface water runoff, temperature, etc.

Water Quality Modeling, Seadrift, Texas, Dr. Harkins was project manager for a water quality model of a proposed subdivision near Seadrift, Texas located along Espiritu Santo Bay. Initial data collection was completed for model development including biochemical oxygen demand, tides, meteorological factors, benthic demand, surface water runoff, temperature, etc. Alternatives for subdivision design were completed with related water quality effects being addressed.

Water Quality Modeling, Rockport, Texas, Dr. V. Harkins was currently the project manager for a water quality model of a proposed subdivision near Rockport, Texas located along Peet's Bend. A model was developed to assess biochemical oxygen demand, tides, meteorological factors, benthic demand, surface water runoff, temperature, etc.

Texas Commission On Environmental Quality, Austin, Texas: Dr. Harkins reviewed and approved/disapproved over 300 design plans and specifications submitted by public water supply systems in the State of Texas. The review consisted of technical design, capacity calculations and compliance for distribution water lines, ground storage tanks, elevated storage tanks, hydropneumatic tanks, and service pumps and public drinking water wells with well pump capacities. The review was made to ensure compliance with the requirements of TCEQ's Chapter 290 Rules and Regulations for Public Drinking Water Systems and the Texas Health and Safety Code.

Certificate of Convenience and Necessity, Houston, Texas: Dr. Harkins is currently retained by BCWK, L.P. to complete a wastewater transfer, public water system transfer, and CCN transfer for a privately owned water and wastewater system.

Expert Witness, Wholesale Rate Appeal, City of Gladewater, Texas: Dr. Harkins provided expert testimony related to a wholesale water and wastewater rate appeal. As a governmental entity, a rate may be changed without state approval. The water and/or wastewater recipient may file an appeal with the State for review. At such time, evidence must be provided that the rate is fair and justifiable. Dr. Harkins assisted in settlement negotiations through SOAH arbitration.

Expert Witness, Water and Sewer Rate and Tariff Change Application, Austin, Texas: Dr. Harkins provided expert witness testimony for the largest rate case filed with the State of Texas. The applicant provides service to 50,000 connections in the State of Texas. Dr. Harkins testified on the just and reasonability of the rates, the substantially similarity issues for consolidated systems, used and useful

requirements for items to be included in rate base, basic rate design, and all discovery and other formal requirements of the application as it proceeded through the State Office of Administrative Hearings.

Water Rate and Tariff Change Application, Lake Whitney, Texas: Dr. was the project manager for a rate change application filed with the TCEQ for eleven water systems located in central Texas. Dr. Harkins' was overall responsible for the creation and prosecution of the application as well as providing supporting documentation as required for the application. Dr. Harkins provided detailed information for the systems' capital assets.

Environmental Experience

Phase II Environmental Site Investigation: PCB Contamination and Remediation, Houston, Texas: Dr. Harkins was the project manager of an industrial site in Texas contaminated with PCBs and metals. Work has included delineation of the contamination profile, site surveys, groundwater assessment, and remediation design. The site was accepted into the VCP program of the TCEQ. Remediation and closure were completed with successful liability release.

Pantex/BWXT Site-Wide Ecological Risk Assessment (ERA), Amarillo, Texas: Dr. Harkins served the field manager for the sample collection for data needed to support the era. Both surface water and sediment samples were collected over an 18 month period to represent potential points of exposure and biologically active zones.

San Antonio Bay and Estuary Study, San Antonio, Texas: Dr. Harkins assisted in the study and development of instream flows necessary to maintain the health of the bay and estuary. The project consists of a review of State methodology, data collection and assessment with an intensive study into the equations used to develop harvest equations used to quantify the health of the bay. Dr. Harkins was the task leader for data assessment, acquisition, evaluation and management of the data. Numerous state and federal agencies were contacted for physical, chemical, biological, hydrological, meteorological, and ecological data such as TWDB, TCEQ, TPWD, TDH, NMFS, NWS, USGS, etc. The data was acquired and inventoried into a database for evaluation of temporal, spatial, parameters measured, format, accessibility and costs to acquire.

L. Stephen Stecher, P.E.

President / Principal Engineer

EDUCATION

- M.S. Civil Engineering, University of Texas, Austin, Texas, 1985
- B.S. Civil Engineering with Highest Honors, University of Texas, Austin, Texas 1978

PROFESSIONAL REGISTRATIONS

- Professional Engineer, Texas No. 55645

EXPERIENCE

Mr. L. Stephen Stecher, P.E., President of Crespo Consulting Services, directs a locally-owned and operated civil and environmental engineering firm in Austin. He possesses 24+ years of project management experience and 30 years of engineering experience in civil engineering related to hydrologic, hydraulic, water quality studies and design, and water resources planning in Texas, including hydrologic modeling and reservoir evaluations. Much of Mr. Stecher's direct project experience involves drainage, flooding, water quality and erosion in the Austin area. Mr. Stecher has performed or directed numerous engineering projects including street, drainage and utility design; Storm Water Pollution Protection Plans (SW3P); channel improvements for flood and erosion control; design and permitting of innovative water quality facilities and flood management projects; design of regional detention facilities and park improvements; preparation and updating of watershed master plans; hydrologic and hydraulic modeling; revising and updating of FEMA maps; and use and analysis of GIS for watershed planning and engineering.

Representative project experience in engineering includes the following:

City of Austin Water Resources Planning Study, Austin, Texas, 2005-2007: Provided engineering services to identify and evaluate surface water supply alternatives for inclusion into the Integrated Water Resources Plan for the City of Austin. Work included: a water availability modeling (WAM) analysis using the WRAP model, and a water rights permitting analysis to develop technically sound and environmentally feasible surface water alternatives for the City. Use of existing and future surface water reservoirs and modeling of potential impacts were included in the analyses. Crespo produced maps using GIS to illustrate the geographic location of the facilities needed to implement the alternatives.

City of San Marcos Water Supply Master Plan, San Marcos, Texas, 2004: Provided technical direction on water supply planning, water availability modeling, and GIS services for the City's Water Supply Master Plan. Identified and prioritized future water supply projects and utilized a matrix analysis to incorporate regulatory factors and environmental constraints in the decision making process. Directed evaluation of strategies based on methodical research of adopted water supply plans, water rights review using GIS, incorporation of the applicable rules and permits of the Edwards Aquifer Authority. Evaluated water availability using the Guadalupe-San Antonio Water Availability Model and knowledge of Texas water law in performing a study on downstream water users.

Ben White/IH-35 Bioretention/Extended Detention Pond – Austin, Texas, 1999-ongoing: Performed hydrologic and hydraulic modeling of Williamson Creek and the proposed 15-foot diameter tunnel based on existing conditions and the proposed facility design pertaining to drainage and highway improvements along the IH-35 corridor. Performed rainfall-runoff simulations, open channel hydraulic modeling and preliminary design including development of design flows and hydraulic analysis of weirs and pipes. Modeling led to the design of 4 water quality ponds and a final bioretention/extended detention pond to treat storm water runoff from the IH-35/Hwy 71 interchange. This complex project involved not only hydrologic, hydraulic, and storm water

modeling, but also numerous coordination efforts with State agencies and City departments. For the bioretention pond, Crespo determined the most cost-efficient design and produced the construction documents for the project.

TCEQ Texas River Basins Water Availability Modeling, Various, Texas, 2001-2003: Developed naturalized flows and water availability models (WRAP), including supervision of GIS analysis of drainage basin and stream networks and the compilation of reservoir and stream data. Simulated reservoir models, performed statistical analyses of gage data, developed reservoir evaporation data and evaluated spring flow, and directed the review of discharge permits and calculations of historical and permitted discharges of wastewater treatment plants. Work included estimating population projections and results from regional studies to estimate future water usage and wastewater flows. Performed reservoir volume analyses, developed rainfall, runoff and evaporation characteristics throughout the basin and simulated reservoir inflow, discharge and content.

Gilleland Creek Modeling and Mapping Project – Austin, Texas. 2007-2008: Developed a HEC-RAS model using ArcGIS and HEC-GeoRAS based on data including surveyed cross sections, LIDAR based elevation data, field observations, and as-built drawings of existing structures to develop new, existing and future water surface elevation profiles for the entire Elm Creek portion of the Gilleland Watershed for the purpose of remapping the floodplain. Completed a Watershed Flood Hazard Assessment to determine an estimate of the number of structures inundated and the depth of inundation for each storm return frequency.

Big Cypress Water Quality Monitoring, Northeast Texas, 1998-1999: Performed water quality modeling of the Big Cypress Creek and Tankersley Creek upstream of Lake-of-the-Pines. This work included a hydrologic evaluation of point and nonpoint source pollution, including an existing industrial discharge, the existing municipal discharges, a proposed industrial discharge and agricultural nonpoint source pollution. This effort served as a preliminary step in the development of a TMDL and reclassifying the water bodies on the 303(d) list. Modified and updated the existing TCEQ QUAL-TX model. Developed control measures to protect the water resources.

Collin County Arts Center Storm Water Management Plan, Allen, Texas, 2006-2008: Directed the storm water and environmental engineering aspects for the new Collin County Arts Center in Allen, Texas. Designed an innovative storm water system that was aesthetically pleasing, effective at removing pollutants from the storm water, and efficient at controlling runoff. Also designed streambank stabilization for banks of the creek that received the storm water and for fixing existing erosion problems. Supervised the environmental construction drawings for the project.

Barton Hills Retrofit, Austin, Texas, 2002-2007: Evaluated a number of nonpoint source pollution controls to reduce the amount of pollution and sediment reaching Barton Creek and Barton Springs Pool. Conducted geomorphic and sediment transport studies in conjunction with an environmental assessment, hydraulic and hydrologic modeling, and floodplain analyses in order to develop an integrated solution to managing the site's storm water. Directed the development of a WPAP and the final project design which included erosion control measures, a sedimentation/infiltration pond, storm sewers and inlets, channel revegetation, tree mitigation and planting plan, and parkland aesthetics.

Marble Creek/Thaxton Road Culvert Project, Travis County, Texas, 2007-2008: Responsible for the design and evaluation of two alternative culvert designs for Thaxton Road over Marble Creek in order to construct a bridge that would be sufficient for a 25-year flood. Performed hydraulic modeling using HEC-RAS to compare the resulting water surface elevations of the existing conditions to determine any negative impacts to upstream and/or downstream property owners and to evaluate velocities and shear forces for low and high flows.

John Clement

Hydrologist/Staff Scientist

EDUCATION

- Ph.D. Botany, University of Texas, Austin, Texas, 1997
- B.S. Biology, University of Nebraska, 1991

PROFESSIONAL REGISTRATIONS

- Certified Floodplain Manager, Texas No. 1230- 07N

EXPERIENCE

Dr. Clement has been involved in many aspects of civil and environmental engineering projects related to water quality, drainage, regulatory review and environmental assessment. He has performed extensive technical work related to water quality design, drainage studies and hydrologic and hydraulic analysis, as well as wastewater modeling, water availability modeling, and digital terrain modeling. He has performed rainfall/runoff and hydraulic analyses using HEC-1, HEC-HMS, HEC-RAS, SWMM and SWAT. He also has considerable experience developing and analyzing GIS data for watersheds and hydrology using ArcView GIS and Spatial Analyst. He has utilized digital elevation models (DEMs) for watershed characterization and the development of rainfall/runoff models. He has performed drafting and design work in both AutoCAD and MicroStation.

Representative project experience in engineering includes the following:

Water Availability Modeling – Various, Texas, 1999 – 2002: Dr. Clement has been involved in several Water Availability Modeling (WAM) projects with the TCEQ. For the Nueces-Rio Grande and Guadalupe-San Antonio-Nueces WAM projects he analyzed DEMs, land use coverages and soil coverages with ArcView GIS Spatial Analyst to create precipitation-runoff models, including SWAT. He contributed statistical and graphical analyses of rainfall, evaporation and streamflow, as well as ArcView GIS-based studies of water usage and return flows to the Colorado River and Trinity River WAMs. He provided GIS mapping support to the Red-Canadian, Rio Grande, Brazos-San Jacinto Coastal, San Jacinto-Trinity Coastal and Sabine River WAMs.

Waller Creek Tunnel – Austin, Texas, 2008 – ongoing: Currently assisting in development of CLOMR request to FEMA for the City of Austin Waller Creek Tunnel project for construction of a riverwalk in downtown Austin. This work involved review of hydrologic and hydraulic models, spatial and 3D analysis in GIS and floodplain mapping.

Ben White/IH-35 Interchange Bioretention/Extended Detention Pond – Austin, Texas, 1999 - ongoing: Coordinated design of a water quality pond associated with highway interchange improvements for the City of Austin Watershed Protection and Development Review Department. Previously developed an EPA SWMM model to simulate stormwater runoff and pollutant loads to the pond site and performed a water balance analysis of the site based on the SWMM model output. Also performed dam safety analysis, assisted in coordinating work in TxDOT ROW and contributed to the USACE Section 404 Pre-Construction Notification submittal.

Cibolo Creek Modeling Project, Fair Oaks Ranch – Fair Oaks, Texas, 2007: Evaluated methodology of hydrologic components of a floodplain mapping project including peak flow estimation, runoff volume estimation, routing and storage procedures and model calibration.

City of Fredericksburg Drainage Master Plan – Fredericksburg, Texas, 1999 – 2003: Performed technical work on several flood control projects involving storm sewer design. Developed watershed information for the projects, performed preliminary hydraulic calculations, estimated the preliminary pipes sizes, and developed a rainfall-runoff model for a detention pond simulating the 2-, 25- and 100-year storms.

Barton Hills Water Quality Retrofit – Austin, Texas, 2002 – 2007: Evaluated a number of water quality approaches to reduce the quantity of pollutant and sediment reaching nearby Barton Creek. Numerous alternatives were evaluated, including trash catchment devices, oil/grit separators, various detention/water quality ponds, vegetated swales, streambank stabilization and storm sewers. Responsible for developing and submitting the Water Pollution Abatement Plan and the Sewer Collection System Plan applications to TCEQ for the City of Austin.

William Cannon Bridge over Onion Creek – Austin, Texas, 2006 – ongoing: Performed a preliminary bridge scour analysis for the proposed bridge crossing based on TxDOT procedures. Work included use of the bridge scour features in HEC-RAS as well as tractive force and bed material sizing calculations. The analysis showed potential scouring from bridge construction. Designed temporary and permanent erosion and sedimentation controls for bridge construction, staging areas and surrounding existing water quality ponds.

Cordillera Ranch Development Company Dam Safety and Floodplain Analyses – Boerne, Texas, 2004 – 2006: Delineated watershed boundaries, digitized FEMA FIRMs and produced revised floodplain maps for several streams along the Guadalupe River in Kendall County.

Pulte Homes/Ryland Homes Hometown Kyle CLOMR and LOMR – Hays County, Texas, 2003 - 2008: Performed hydrologic and hydraulic modeling in preparation of the CLOMR and LOMR for a tributary upstream of FM 150. Prepared the documents requesting a LOMR from FEMA to reflect the proposed channel improvements and filling of the existing floodplain adjacent to the new subdivision.

Waller Creek Sanitary Sewer Evaluation Study – Austin, Texas, 2000 – 2001: Determined the catchment area for several flow meters and delineated 138 subcatchments for a HydroWorks model. Determined the location of major users within the metered watersheds in order to estimate distribution of wastewater flows. Reviewed the plan and profile information to correctly identify the inspected lines on the GIS.

Nutty Brown Road Contributing Zone Plan – Hays County, Texas, 2003 - 2005: Prepared an Edwards Aquifer Contributing Zone Plan for this road improvement project. Work involved developing a pollutant loading analysis and conceptual design of vegetative filter strips.

Spyglass and Waterfall Grotto Water Quality Retrofit – Austin, Texas, 2002 -2004: Performed rainfall/runoff and pollutant loading and removal analyses for the Spyglass and Waterfall Grotto watersheds for a City of Austin retrofit project adjacent to the Barton Creek Greenbelt. Estimated sedimentation/filtration pond sizes based on these analyses and developed LID-type designs for subareas that could not be routed to ponds.

Little Walnut Low Impact Development Retrofit – Austin, Texas, 2003: Evaluated three small watersheds for suitability to be treated with various LID approaches. This work involved generating preliminary designs and meeting pollutant removal criteria for vegetated swales, vegetative filter strips and an extended detention pond. Performed rainfall/runoff and pollutant loading analyses in order evaluate and recommend specific treatment approaches.

John R. Middleton

Hydrologist/Staff Engineer

EDUCATION

- M.S. Civil Engineering, University of Texas at Austin, Texas, 2006
- B.S. Electrical Engineering, University of Texas at Austin, Texas, 1980

PROFESSIONAL REGISTRATIONS

- Engineer-in-Training, Texas

EXPERIENCE

Mr. John Middleton earned a masters degree in environmental engineering from the University of Texas with a focus on water resources and water quality. His experience includes storm water treatment BMPs, storm water monitoring, hydrologic and hydraulic modeling, and GIS, including design and testing of innovative stormwater controls. He has over twenty years of experience in engineering and management working in high tech companies in Austin, including circuit design, test, customer support, project management, budgeting, and scheduling. Mr. Middleton has worked on several hydrologic and hydraulic projects in addition to performing work on water supply and storm water projects. He has experience with HEC-1, HEC-RAS and HEC-geoRAS, as well as MODFLOW and GIS applications.

Representative project experience in engineering includes the following:

Gilleland Creek Modeling and Mapping Project – Austin, Texas, 2007 - ongoing: Currently developing digital geo-referenced hydrologic and hydraulic models and floodplain maps for the Elm Creek portion of the Gilleland watershed for both existing and future land-use conditions. Performed field reconnaissance to study the watershed, measure hydraulic structures, and determine land use and vegetative cover. Developed a HEC-RAS hydraulic model for Elm Creek using ArcGIS, HEC-GeoRAS, and various elevation data. Currently using the HEC-RAS model to model multiple storm events and to develop new, existing and future water surface elevation profiles for the entire Elm Creek Watershed for the purpose of remapping the floodplain.

Brodie Oaks Water Quality Pond Retrofit - Austin, Texas, 2008 - ongoing: Currently designing a retrofit for a water quality pond located over the Edwards Aquifer recharge zone. The retrofit will include innovative filters and bioretention features to improve pollutant removal and overall performance of the pond. Work will include a hydraulic analysis and assisting with the probable cost estimation.

Marble Creek/Thaxton Road Culvert Project – Travis County/Austin, Texas, 2007 - 2008: Performed hydraulic modeling for the City of Austin using HEC-RAS and compared the resulting water surface elevations to the existing conditions to determine any negative impacts to upstream and/or downstream property owners and to evaluate velocities and shear forces for low and high flows. Assisted with the design of the channel restoration measures for approximately 400 LF of Marble Creek, including streambank stabilization and re-vegetation.

Southeast Austin Associates Airport Commerce Park Drainage Analysis and Pond Redesign – Austin, Texas, 2007 - 2008: Provided technical and engineering services related to the detention pond at Airport Commerce Park and Storm Sewer Line A. Completed the following tasks: created a drainage report describing the capacity issues with storm sewer Line A and the alternative design proposed to correct the issues; made design modifications to an earthen dam required to comply with state and city regulations for dams; evaluated and redesigned a detention basin to correct submersion of basin outlets; and evaluated the eastern portion of the property fronting US 183 and extending east to Carson Creek, including floodplain evaluation and performance of hydrologic/hydraulic analyses. Performed the

drainage analysis and hydrologic modeling using StormCAD, HEC-1 and HEC-HMS for this development. Work resulted in recommendations for the new outlets, a larger spillway and a reinforced dam embankment.

City of Fair Oaks Cibolo Creek Modeling Project Fair Oaks Ranch – Fair Oaks, Texas: Provided engineering and technical services to review and evaluate the hydrologic and hydraulic modeling of Cibolo Creek, to be used by FEMA as the basis for remapping the 100-year floodplain of Cibolo Creek. This project utilized rainfall, infiltration and initial water surface data to evaluate the FEMA hydrologic and hydraulic models. Work included updating the HEC-HMS model to generate modified flows in order to demonstrate possible changes to the 100-year flood plain mapping.

Champion Toyota Drainage Analysis – Austin, Texas, 2006 -2008: Completed a hydrologic/hydraulic evaluation to determine the effects of site development on overall drainage. Performed a drainage analysis and hydrologic modeling of the site and the detention pond. Work included modeling the storm sewer line to evaluate tailwater conditions in the sewer line.

Harper's Branch Streambank Stabilization Project – Austin, Texas, 2006 - ongoing: Performed hydraulic modeling of Harper's Branch for the City of Austin's Clean Water Program. Used HEC-RAS model to evaluate velocities and shear forces for low and high flows and determine locations requiring streambank stabilization. Designed streambank stabilization for impacted areas of the creek. Currently performing construction services that include on-site inspection of streambank stabilization construction.

Municipal Separate Storm Sewer System Survey – central and western Texas, 2007 - 2008: Part of the survey crew collecting data throughout five (5) TxDOT Districts for Municipal Separate Storm Sewer Systems (MS4). Performed mapping of the above ground storm sewer system by conducting field investigations and utilizing a GPS unit with sub-meter accuracy to map feature points of the storm sewer system, including: outfalls, culverts, inlets, manholes, and headwalls. Included extensive surveys in the Austin, Waco, Amarillo, Lubbock and Brownwood TxDOT Districts.

Collin County Arts Center Storm Water Management Plan – Allen, Texas, 2006 - 2008: Designed grass swales, channels, trench drains, storm sewer pipes, culverts, and inlets. Worked on streambank stabilization designs to stabilize the banks of the creek and adjacent trail to fix existing erosion problems.

Railroad Commission Dugout Creek Site Remediation Investigations – Howard County, Texas, 2007 - 2008: Performed field assessment of seeps and creeks contaminated from drilling activities. Recommended BMPs including recovery trenches and recovery sumps to prevent chlorides from entering creeks and eventually the upper Colorado River.

Railroad Commission, Roeling Vacuum Site Remediation Investigation, Liberty County, Texas, 2007-2008: Performed field assessment of an abandoned disposal site for the Texas Railroad Commission. Recommended methods for isolating on-site surface runoff, and preventing offsite runoff from entering site.

EXHIBIT G

Not less than 30 days before board consideration of the application, the NTMWD and NETMWD published notice in the following newspapers of general circulation:

REGION C

- Dallas Morning News
- Fort Worth Star Telegram

REGION D

- Texarkana Gazette
- Daily News Telegram (Sulphur Springs)
- Longview Newspaper
- The Paris News
- Tyler Morning Telegraph
- Mt. Pleasant Daily Tribune

Not less than 30 days before board consideration of the application, the NTMWD and NETMWD mailed notice to each mayor of a municipality with a population of 1,000 or more or which is a county seat and that is located in whole or in part in the regional water planning area, and to each county judge of a county located in whole or in part in the regional water planning area, and to the Regional Water Planning Groups.

A copy of the mailed notice and the mailing lists are included in Exhibit G.

Publisher's affidavits will be provided once they are received.

STUDY COMMISSION ON REGION C WATER SUPPLY

Senate Bill 3 – 80th Legislative Session

TO: Mayors, County Judges, Regional Water Planning Groups

FROM: Study Commission on Region C Water Supply

RE: Public Notice of Application for Water Planning Grant

DATE: December 15, 2008

PUBLIC NOTICE

To All Interested Parties:

Notice is hereby given that the North Texas Municipal Water District (NTMWD) will submit on December 16, 2008, a grant application for financial assistance to the Texas Water Development Board (TWDB) on behalf of the Study Commission on Region C Water Supply to carry out the legislative charges in Senate Bill 3 Section 4.04 of the 80th Legislative Session and the scope of work as published on pages 8838 through 8844 of Volume 33, Number 43, of the Texas Register published on October 24, 2008.

Copies of the grant application may be obtained from the Study Commission on Region C Water Supply by contacting Jim Parks, NTMWD, P.O. Box 2408, Wylie, TX 75098, telephone number (972) 442-5405, or at the following internet address: http://www.twdb.state.tx.us/wrpi/rwp/committee/rgc/rgc.htm. Written comments regarding the grant application must be submitted by 1:00 p.m. on January 14, 2009, to the Study Commission on Region C Water Supply, c/o NTMWD, ATTN: Jim Parks, P.O. Box 2408, Wylie, TX 75098, and to J. Kevin Ward, Executive Administrator, TWDB, P.O. Box 13231, Austin, TX 78711-3231.

For additional information, please contact Jim Parks, NTMWD, P.O. Box 2408, Wylie, TX 75098, telephone number (972) 442-5405. The NTMWD is the Administrator for the Study Commission on Region C Water Supply.

c/o NTMWD
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Wylie, TX 75098
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jparks@ntmwd.com

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The Honorable Keith Self
County Judge
Collin County
210 South McDonald Street
McKinney, TX 75069

The Honorable Chad Adams
County Judge
Ellis County
101 West Main
Waxahachie, TX 75165

The Honorable Mark Riley
County Judge
Parker County
One Courthouse Square
Weatherford, TX 76086

The Honorable Bill McElhaney
County Judge
Wise County
P. O. Box 393
Decatur, TX 76234

The Honorable Butch Henderson
County Judge
Fannin County
101 East Sam Rayburn Drive
Bonham, TX 75418

The Honorable David Holstein
County Judge
Henderson County
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Athens, TX 75751

The Honorable Jim Foster
County Judge
Dallas County
411 Elm Street
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The Honorable Wayne Gent
County Judge
Kaufman County
100 West Mulberry Street
Kaufman, TX 75142

The Honorable Chris Florance
County Judge
Rockwall County
101 E. Rusk Street, St. 202
Rockwall, TX 75087

The Honorable Bill Freeman
County Judge
Cooke County
100 South Dixon, Room 110
Gainesville, TX 76240

The Honorable Mitchell G. Davenport
County Judge
Jack County
100 Main Street
Jacksboro, TX 76056

The Honorable Mary Horn
County Judge
Denton County
110 West Hickory
Denton, TX 76201

The Honorable H. M. Davenport, Jr.
County Judge
Navarro County
300 West 3rd Avenue, St. 102
Corsicana, TX 75110

The Honorable B. Glen Whitley
County Judge
Tarrant County
100 East Weatherford
Fort Worth, TX 76102

The Honorable Drue Bynum
County Judge
Grayson County
100 West Houston
Sherman, TX 75090

The Honorable Linda Grant
County Judge
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