

## **I. GENERAL INFORMATION**

- (1) **Legal Name of Applicant(s):**  
High Plains Underground Water Conservation District No. 1 on behalf of  
Llano Estacado Regional Water Planning Group (LERWPG)
- (2) **Regional Water Planning Group:**  
Region O – Llano Estacado Region
- (3) **Authority of Law Under Which the Applicant was Created:**  
Article XVI, Section 59, Texas Constitution.  
High Plains Underground Water Conservation District No. 1 was Designated as a  
Representative of the Regional Water Planning Group on March 18, 2002
- (4) **Applicant's Official Representative:**  
Jim Conkwright, General Manager  
High Plains Underground Water Conservation District No. 1  
2930 Avenue Q  
Lubbock, Texas 79405  
Telephone: (806) 762-0181  
Fax: (806) 762- 1834  
E-mail: [hpwd@hpwd.com](mailto:hpwd@hpwd.com)  
Vendor ID Number: 17560036547-001
- (5) **Application in Response to a Request for Proposals published in the Texas Register?**  
Yes
- (6) **Document Number and Date of Publication of the Texas Register:**  
RWP RFP, 31 TexReg 5210 June 23, 2006 Texas Register
- (7) **Type of Proposed Planning**
- Initial Scope of Work -- yes,
  - Development of a regional water plan – yes,
  - Revision of a regional water plan – no,
  - Special studies approved the TWDB – yes.
- (8) **Total Proposed Planning Cost**  
\$ 44,475 plus Scope of Work.
- (9) **Cash Contribution to the Study**  
(Zero)
- (10) **List Source of Cash Contribution, Explanation of Source of Local Cash Contribution**  
(None)

- (11) **Total Grant Funds Requested from the Texas Water Development Board**  
44,475 plus Scope of Work.
- (12) **Detailed Statement of the Purpose for Which the Money will be Used. (Not to exceed 1 page).**

Funding will be used to develop information need to deal with water supplies needed by water user groups in Regions O and A, as explained below.

Due to drought, there has been a reduction in water supplies available from the Canadian River Municipal Water Authority's (CRMWA) Lake Meredith. Several important municipal WUGs of Region O (Plainview, Lubbock, Slaton, Tahoka, O'Donnell, Lamesa, Brownfield, and Levelland) currently have sources of supply in neighboring Region A through the CRMWA system, including both surface and groundwater, and due to drought conditions of the Canadian Basin, it has become clear that Region O needs to consider and evaluate additional sources of supply, including consideration of potential sources from Region A. In this regard, it is necessary to conduct interregional coordination efforts between Regions O and A. Quantification of Recharge to the Ogallala Aquifer in the Eastern Panhandle of Texas is needed and is supported by Region O as included in Region A's Scope of Work and Planning Grant Application, and is Region O's Priority A, or Priority No. 1.

Region O's Priority B, or Priority No. 2 is to conduct an evaluation of Changed Conditions in Castro, Deaf Smith, and Parmer Counties of Region O (New Industry). The changed conditions are the addition of ethanol plants and a larger number of dairies than anticipated in the development of the 2006 Regional Water Plan. Funding will be used to estimate additions to population and water demand needed for increased population, the new industries, and irrigated agriculture, and to evaluate the Dockum Aquifer, including estimation of cost of desalting water from the Dockum to meet these new demands. In Castro, Deaf Smith, and Parmer Counties the 2006 Regional Water Plan showed a water shortage of 336,925 acre-feet in 2010, rising to 861,141 acre-feet in 2060.

Region O's Priority C, or Priority No. 3 is the development of telecommunications for improved coordination between Regions A, O, and others, as needed. The requested funding would be used to identify and describe Telecommunications Services needed by Regions A and O for coordination of regional water planning, and to present estimates of costs of telecommunications services for these purposes.

- (13) **Detailed description of why state funding assistance is needed. (Not to exceed 1 page).**

Pursuant to Senate Bill 1 (1997) Texas was divided into 16 water planning regions by the TWDB, with each region required to develop and adopt a regional water plan in 2001, and every 5 years thereafter. In response to Senate Bill 1, as amended, the Llano Estacado Region (Region O) has developed regional water plans for 2001, and 2006, and is beginning the process to develop a plan for 2011.

Since no other sources of funding are available for these purposes state funding assistance is needed.

**(14) Identify potential sources and amounts of funding available for implementation of viable solutions resulting from proposed planning.**

Local water user groups who need water are expected to finance those facilities needed from their own sources, and state loans and state participation funding, as needed.

**II. PLANNING INFORMATION**

**(15) A detailed scope of work for proposed planning. (Not to exceed 6 pages.)**

**(To be inserted upon approval by LERWPG)**

**(16) Prioritization of scope of work tasks by the regional planning group.**

**Priority Number 1: Topic A: Quantification of Recharge to the Ogallala Aquifer in the Eastern Panhandle of Texas (In support of and in cooperation with Region A, as included in Region A’s Scope of Work and Planning Grant Application);**

**Priority Number 2: Topic B: Estimation of Population and Water Demand Increases, and Evaluation of Desalination of Water from the Dockum Aquifer in Response to Changed Conditions in Castro, Deaf Smith, and Parmer Counties of Region O (New Industry); and**

**Priority Number 3: Topic C: Regional Coordination of Regions O and A – Use of Telecommunications to facilitate Joint Meetings.**

**(17) A task budget for detailed scope of work by task:**

<b>TASK</b>	<b>DESCRIPTION</b>	<b>HPUWCD</b>	<b>CONSULTANT</b>	<b>TOTAL</b>
0	Scope of Work	0	\$ 8,000	\$8,000
1	Planning area description	0	0	0
2	Review and revision of population and water demand projections	yyyy	\$ xxxx	xxxx
3	Water supply analysis	yyyy	xxxx	0
4	Identification, evaluation, and selection of water management strategies based on needs	yyyy	\$ xxxx	xxxxx
5	Impacts of Selected Water Management Strategies on Key Parameters of Water Quality and Impacts of Moving Water from Rural and Agricultural Areas	0	0	0
6	Water Conservation and Drought Management Recommendations	0	0	0
7	Description of How the Regional Water Plan is Consistent with Long-term Protection of the State's Water Resources, Agricultural Resources, and Natural Resources	0	0	0
8	Unique stream segments/reservoir sites /legislative recommendations	0	0	0
9	Report to Legislature on Water Infrastructure Funding Recommendation	0	0	0
10	Adoption of Plan	\$ 44,475	\$ xxxxx	xxxx
	Subtotal	zzzzz	\$ xxxxx	xxxx
	Total	zzzzz	\$xxxxx	xxxx

**(18) An expense budget for detailed scope of work by expense category:**

<b>CATEGORY</b>	<b>HPUWCD No. 1</b>	<b>Subcontractor</b>
Salaries & Wages	xxx	zzz
Fringe	xxx	zzz
Travel	xxx	zzz
Other Expenses	xxx	zzz
Subcontract Services	xxx	zzz
Voting Member Travel	xxx	zzz
Overhead	xxx	zzz
Profit	xxx	zzz
<b>TOTAL</b>	<b>xxx</b>	<b>zzz</b>

**(19) A time schedule for completing detailed Scope of Work by task.**

<b>Tasks</b>	<b>Months 1 -- 6</b>	<b>Months 7 -- 12</b>	<b>Months 13 -- 18</b>	<b>Months 19 -- 24</b>
Task B1.a				
Task B1.b				
Task B1.c				
Task B1.d				
Task B1.e				
Task B2.a				
Task B2.b				
Task B2.c				
Task B2.d				
Task B2.e				
Task C.a				
Task C.b				
Completion				

**(20) Specific deliverables for each task in Scope of Work.**

The results of work of each task will be presented in draft report form (Technical Report in accordance with TWDB planning report guidelines) to the Regional Water Planning Group at regularly scheduled planning group meetings for review. Upon response to the review, appropriate changes and/or corrections will be made, and final report(s) will be submitted to the planning group and the TWDB.

**(21) Method of monitoring study progress.**

The High Plains Underground Water Conservation District No. 1 (HPUWCD) will provide administrative functions in support of all activities, including contract administration, subconsultant contract management and oversight, meeting preparation and management, posting of meeting notices, meeting attendance, and public participation activities.

Monthly progress reports will be required of the subconsultant, and will be a part of the monthly requests for reimbursement from TWDB.

Periodic progress meetings will be held with the subconsultant by the (HPUWCD) to review progress, and the subconsultant will be required to make presentations to the LERWPG at appropriate points of the work. Draft and final reports will be required of the subconsultant, and transmitted to TWDB, in accordance with planning contract procedures and requirements.

**(22) Qualifications and direct experience of proposed project staff.**

Proposed Project Staff: LERWPG Members.

Harold P. “Bo” Brown Jr., Chair, LERWPG: Mr. Brown is an attorney and rancher.

Jim Conkwright: Mr. Conkwright is manager of HPUWCD No. 1, the political subdivision selected by LERWPG to administer Llano Estacado Water Planning, pursuant to SB 1, as amended.

Subconsultant Project Staff: Herbert W. Grubb, Ph.D., Larry Land, P.E. and Mark Graves, P.E. (See resumes attached).

**WRITTEN ASSURANCES**

1. The proposed work does not duplicate existing projects.
2. Implementation of viable solutions identified through the proposed planning will be diligently pursued and identification of potential sources of funding for implementation of viable solutions will be done.

**PROOF OF NOTIFICATION**

Notice will be provided, not less than 30 days before board consideration of the application, that an application for planning assistance is being filed with the executive administrator. This notification will be accomplished by:

- (1) Publishing notice in a newspaper of general circulation in each county located in whole or in part in the Llano Estacado Water Planning Region, and
2. Mailing notice to: (a) 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 Llano Estacado Regional Water Planning Area, (b) each county judge of counties located in whole or in part in the Llano Estacado Regional Water Planning Area, (c) each regional water planning group chairperson within Texas, and (d) river authorities and districts within the Llano Estacado Regional Water Planning area.

A copy of the notice will be sent to the Board, with 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.

## **Herbert W. Grubb, Ph. D.**

### **Education**

Ph.D. Agricultural Economics, North Carolina State University, 1964

M.S. Agricultural Economics, Oklahoma State University, 1960

B.S. Agricultural Education, Berea College, 1958

### **Experience**

Dr. Grubb is a water resources planner, with emphasis in water development, regional water and sewer systems, and municipal and agricultural water conservation. He was Director of Planning for the Texas Water Development Board from 1976 through 1988, where he supervised the planning staff and was principal author of the 1984 Comprehensive Texas Water Plan. As Director of water planning he prepared and presented testimony before State and Federal legislative committees and State and Federal administrative agencies, and made numerous presentations of water planning information at public meetings. Since 1988, Dr. Grubb has been a member of HDR Engineering, Inc.'s water resources planning staff where he has done water planning and water conservation studies for individual cities, river basins, and multi-basin regions. He has written more than 80 reports, papers, and journal articles pertaining to water resources and economic development. Representative experience includes:

### **Regional Water Planning**

Project Manager for 20.5 county South Central Texas and the 21 county Llano Estacado Regional Water Planning projects from 1998 through 2000. These planning efforts are being carried out by The Texas Water development Board under Senate Bill 1 enacted in 1997 by the Texas Legislature to develop water plans to meet the needs of regions of Texas through 2050. The plans include descriptions of the respective regions, evaluations of available water supplies to meet projected water shortages of each water user group of each county of each region, identification and evaluation of quantities, costs, and environmental effects of water management strategies to meet each projected water shortage, and descriptions of plans to meet each projected shortage. The Regional Water Planning Group of each region guided and directed the selection of water management strategies included in each regional plan. These regional planning activities are being continued, as directed by Senate Bill 2 enacted by the Texas Legislature in 2001, with completion of revision and updates of the regional plans prepared for Senate Bill 1 scheduled in 2006. **San Antonio River Authority, South Central Texas Regional Planning Group, San Antonio, Texas, and High Plains Underground Water Conservation District No. 1, Lubbock Texas, respectively.**

### **Professional Endeavors**

HDR Engineering, Inc. (1988 – Present)

Texas Water Development Board and Texas Department of Water Resources (1976—1988)

Office of the Governor, State of Texas (1968—1975)

Texas Tech University and South Plains Research and Extension Center, Texas A & M University (Joint Appointment; 1964 – 1968).

# Larry F. Land

## Senior Project Manager

### Education

Master of Science, Agricultural Engineering, Colorado State University, 1967

Bachelor of Science, Agricultural Engineering, Texas Tech University, 1965

### Professional Registrations

Professional Engineer, Texas, No. 31380, 1971

### Professional Affiliations

American Water Resources Association, Member

American Water Works Association, Member

National Ground Water Association, Member

National Society of Professional Engineers (NSPE), Texas (NSPE), Member

### HDR Tenure

8 Years

### Industry Tenure

39 Years

### Professional Experience

Mr. Land has over 37 years experience as a water resources engineer. His career includes over 30 years of experience with the U.S. Geological Survey-Water Resource Division. He has worked in the fields of ground water, surface water, and water quality. Mr. Land's greatest interests are solving water supply problems and issues and bringing all the disciplines of hydrology together for a comprehensive, technical assessment. His activities with HDR have been in water-resource planning, development, monitoring, well design, well field evaluation, and conjunctive use of surface water and ground water.

#### *HDR Project Experience*

**Assessment and Management of Water Supplies in the Republican River Basin.** Project Engineer. The Republican River starts in Colorado, flows into Kansas, then Nebraska, and finally back into Kansas. To allocate the surface water supplies in the late 1930s and early 1940s, the three states formed the Republican River Compact. Since, several reservoirs were constructed to develop the surface water supplies for irrigation and flood control, and wells have been constructed, mostly for irrigation, in all three states. Over the years, the streamflow has been declining; and, Kansas has blamed the upstream states wells as the cause. Mr. Land has assisted Nebraska and its defense team in determining the amount of streamflow declines and the causes. He is very much involved in the development of groundwater flow and stream-reservoir models for legal defense purposes as well as management tools.

**Assessment of Aquifer Storage and Recovery in the Brazos River Alluvium.** Project Manager. One alternative in expanding the water supplies in the Brazos River basin is to store excess surface water and recover the water during periods of shortage. Mr. Land proposed a concept to divert water from the Brazos River during seasons of high flow and to recharge the nearby Brazos River Alluvium and to recover the water with wells during the season of high summer demands or drought. Mr. Land is testing this concept by the development and application of a MODFLOW groundwater model of the study area.

**Bureau of Reclamation, Assessment of Western Navajo and Hopi Tribes Water Supply Needs Distribution Analysis Alternatives and Impacts, AZ, NV.** Quality Control Reviewer. In support of the Little Colorado River Water Rights Negotiations between the U.S. Government and the Navajo Nation and Hopi Tribe, Mr. Land is a member of a team of scientists and engineers within HDR and other consulting firms who are developing a comprehensive water development plan for the Navajo and Hopi communities of northeast Arizona for the U.S. Bureau of Reclamation. Mr. Land is providing guidance in the

development of the technical work plans for the assessment of the surface water and groundwater resources and water supply projects, which includes the development and application of models. His primary role is providing quality assurance and control in the preparation, analyses and reporting of the groundwater resource assessment, the assessment of potential groundwater development strategies and their impacts.

**Calculating Volume of Groundwater in Storage.** Project Engineer. The Llano Estacado Regional Water Planning Group is developing long range water plans for the central part of the High Plains Aquifer. In support of the planning, the groundwater in storage was calculated for several counties using aquifer data from wells in several databases, reports, and Geographic Information System software. In addition, the water table was mapped in 1995 and 1995 were prepared and water level changes were calculated.

**Determination of Brackish Groundwater Supplies in the vicinity of Corpus Christi** is desalination of local surface water (Gulf of Mexico) and groundwater (Gulf Coast Aquifer). To assess the feasibility of developing brackish groundwater, Mr. Land developed a groundwater model of the major water bearing zone of the Gulf Coast Aquifer in Nueces County. He tested three potential well field locations and several different well spacing by calculating drawdowns. He also prepared salinity maps of groundwater in the Goliad Sand to aid in the design of the desalinization facility.

**Review of Groundwater Model for Platte West Well Field (2004-current).** Senior Engineer. The Metropolitan Utilities District (MUD) is in the process of expanding the water supplies for Greater Omaha, Nebraska by installing a well field in the Platte River Valley west of Omaha. To plan and permit the water supply facility with 42 wells producing 90 million gallons per day, a groundwater model (MODFLOW) has been designed and developed by Chatman and Associates, Inc who are under contract with HDR. The model area covers about 650 square miles and has cell dimensions of 100 ft in the vicinity of Platte West Well Field. The model represents, major streams, well pumpage, evapotranspiration, recharge from precipitation and irrigation return flows, and areas outside the model boundary. Mr. Land provided an extensive technical review the models design, calibration, and applications for the district. His comments lead to refining the estimates of recharge and pumpage by irrigation wells, improving the calibration by considering base flow in streams, and clarifying the presentation of effects of Platte West pumping on the surrounding area.

# Mark C. Graves

## Project Manager

### Education

Master of Science, Civil Engineering, University of Texas System, 1998

Bachelor of Science, Civil Engineering, Auburn University, 1995

### Professional Registrations

Professional Engineer - Civil, Texas, No. 90151, 2002

### Professional Affiliations

American Water Works Association, Member

International Desalination Association, Member

Water Environment Federation, Texas Chapter (WEAT), Member

### HDR Tenure

6 Years

### Industry Tenure

11 Years

### Professional Experience

Mr. Mark Graves is located in HDR Engineering's Austin, Texas office. He is project manager with ten years of experience in planning, design, and construction administration for water and wastewater treatment projects and water distribution systems. His experience includes water treatment design and costing including membrane treatment, desalination, ozone, biological filters, and disinfection. Mark has participated in several water supply planning studies and has conducted a variety of treatment system analyses, bench tests, and pilot studies.

#### *HDR Project Experience*

**Water Treatment Plant Expansion 2004, City of Kerrville, Texas.** Project Manager. Project consists of procurement, design, and bidding for a 1.6 MGD low-pressure membrane water treatment plant to expand the water treatment capacity at an existing conventional water treatment plant site. Current design phase consists of a new building with membrane system, electrical and I&C facilities, chemical feed, and modifications/expansion of existing water plant piping and pumps for integration of new membrane water treatment plant.

**Membrane Pilot Study, City of Kerrville, Texas.** Project Manager. Conducted a four-month membrane pilot study to evaluate the performance of competing membrane systems in treating Guadalupe River water. Results used in selection of a membrane treatment system for a 1.6 MGD expansion of existing water treatment capacity.

**Water Supply Study, City of Kenedy, Texas.** Project Engineer. Primary author of water supply and treatment options report. Evaluated upgrades to existing reverse osmosis water desalination plant, alternative treatment options for arsenic and dissolved solids removal, well field expansion, and surface water treatment and delivery options.

**City of Pflugerville Colorado River Water Supply Project.** Project Engineer for a 15 mgd membrane surface water treatment plant. The new plant includes a raw water pump station, ultrafiltration membrane system along with the associated chemical feed systems, clearwell, high service pump station, administration building, residuals handling facilities, plant security and associated site improvements for the plant.

**Texas Water Development Board.** Project Engineer. Primary author of several sections of report, "Desalination for Texas Water Supply", for the Nueces River Authority and Texas Water Development Board. Prepared detailed desalination cost estimating model for a wide range of water conditions and siting factors.

**US Environmental Project Agency.** Project Engineer. Developed design criteria and cost curves for the “Manual of Cost Estimates for Selected Water Treatment Technologies” for EPA. Technologies included membrane treatment (microfiltration, ultrafiltration, nanofiltration, and reverse osmosis), ozone, biologically active filtration, and GAC adsorption.

**Reverse Osmosis Water Desalting Facilities, City of Goodyear, AZ.** Project Engineer. Assist in the design of reverse osmosis desalination facilities at several locations treating brackish groundwater.

**Dallas Water Utilities Evaluation of Lake Texoma Water Supply Options.** Project Engineer. Developed water supply options to deliver Lake Texoma water to the City of Dallas. Conducted evaluations comparing Lake Texoma water quality for raw water, anticipated treated water quality with desalination, and existing City of Dallas distribution system water quality to determine potential for corrosion. Developed treatment requirements, finished water quality goals, and mitigation strategies for the introduction of Lake Texoma water to the City of Dallas distribution system.

**Water Supply Study, City of Graham, TX.** Project Engineer. Project consisted of developing water supply options including the desalination of brackish surface water from Possum Kingdom Lake.

**Lavaca-Navidad River Authority.** Project Manager. Assisted in the development of a desalination water supply option for the Lavaca Regional Water Planning Group (Region P). The plan included evaluation of a seawater desalination plant on the Texas coast and pipelines for transmission to major demand centers near San Antonio, TX.

**Oliver Ranch Trinity Aquifer Water Quality, San Antonio Water System.** Project Manager. Six Trinity Aquifer well sites within Oliver Ranch were evaluated to determine chlorine demand and related water quality parameters to determine the concentration of reduced constituents that may exert a chlorine demand and determine an adequate chlorine dose to maintain a free chlorine residual of at least 0.2 mg/l in the SAWS distribution system.

**ASR Water Treatment Plant, San Antonio Water System.** Project Engineer. A new 30-MGD water treatment facility was constructed as part of the SAWS Aquifer Storage and Recovery (ASR) Project. The plant will initially treat ground water from the Carrizo Aquifer from a well field in south Bexar County, but will likely accept surface water sources in the future. The Carrizo ground water has very high levels of carbon dioxide, hydrogen sulfide, iron (up to 20 mg/L), and manganese (up to 0.5 mg/L). The treatment process selected was defined largely by the results developed in SAWS Multiple Source Water Integration Study, which was completed by Mr. Graves.

**Multiple Source Water Integration Study, San Antonio Water System.** Project Engineer. Oversaw study to quantify the impact that new source waters might have on the existing corrosion scales in the SAWS distribution system. The study utilized old, galvanized pipe samples excavated from the SAWS system. The waters (and blends of waters) were circulated and stagnated in a pipe loop experimental apparatus while water quality changes were monitored. After the potential for iron and corrosion product release was examined, various water conditioning schemes were tested in the loops to determine the treatment requirements and target finished water quality goals for the new sources.

**Water Quality and Treatment Model, City of Corpus Christi, Texas.** Project Engineer. This model was part of a project to comprehensively assess alternative supply system operation scenarios for the City of Corpus Christi. The City is supplied by two sources of water with different chemical qualities. Additional water sources are being evaluated that also differ from the current supply. A water quality and treatment model was developed to assess the impact on plant operations, costs and finished water quality from different blends of these water sources.

**Water Treatment Plant Improvements, City of Alice, Texas.** Project Engineer. Evaluated existing disinfection scheme and recommended improvements. Developed disinfection benchmarking data and analyzed system for current and future SDWA compliance.

*Non-HDR Project Experience*

**Desalination Facilities Evaluation, City of Corpus Christi, Texas.** Project Engineer. Assisted in a feasibility analysis to provide additional water to the Mustang Island-Port Aransas area located on the barrier island offshore of the City of Corpus Christi. The island is currently supplied with water through a water supply pipeline from the mainland. Options to supplement or replace the current water supply with desalinated water from the Gulf of Mexico or brackish water below the island were evaluated. Available desalination options including reverse osmosis and distillation (both for primary desalination and zero discharge co-use with RO) were evaluated and ranked based on cost estimates, siting constraints, regulatory requirements, and local issues.