

EXHIBIT A
SCOPE OF WORK
TO CONTRACT No. 13-656-HCP
BETWEEN THE
EDWARDS AQUIFER AUTHORITY
AND
SWCA ENVIRONMENTAL CONSULTANTS
FOR WATER QUALITY SAMPLING AND ANALYSIS PROGRAM FOR COMAL
AND SAN MARCOS SPRINGS ECOSYSTEMS

SCOPE OF WORK

Task 1. Comal Springs Ecosystem Sampling

This task is divided into several subtasks consisting of surface water sampling, stormwater runoff sampling, well sampling, subsurface sediment sampling, and passive diffusion sampling.

Subtask 1.1 Surface Water Grab Sampling

The Contractor will collect grab samples from the five surface water sampling locations (see attached map), twice during the calendar year, approximately six months apart. Samples will be collected in March and August. Grab samples will be analyzed for the analytical parameters using the analytical methods provided in Table 1.

Subtask 1.2 Surface Water Passive Sampling

The Contractor will perform six sampling events using passive diffusion samplers (PDS) manufactured by Amplified Geochemical Imaging, LLC (or equivalent). A PDS will be placed in each of the sampling locations identified in the attached map for the Comal River. The PDS will be left in place for two weeks at each location. The sampling events will occur in February, April, June, August, October, and December. Purchase price of PDS from Amplified Geochemical includes analysis of a suite of organic compounds.

All analyses, other than those provided for PDS's and provided by Amplified Geochemical Imaging, LLC. will be conducted by a National Environmental Laboratory Accreditation Program (NELAP) laboratory.

Sample sites in the Landa Lake and Comal River area are listed below: (also see attached map)

Upper Springs (near Bleiders Creek);
Upper Landa Lake - (near Spring Island);
Lower Landa Lake - (above outfalls);
Upper Old Channel - (Elizabeth Street); and,
USGS Gauge - (above San Antonio Street Bridge)

Subtask 1.3 Storm Water Sampling

Two storm water sampling events will be performed each year. The Contractor shall schedule these sampling events so that they are approximately six months apart and are representative of different seasons of the year (preferably winter and summer). It is understood that this sampling is dependent on rainfall events; if it becomes apparent that this criteria for a sampling schedule is unable to be met, the Contractor shall propose a new sampling schedule to EAA staff to be approved by EAA. A storm water sampling event will be triggered when the flow rate at the U.S. Geological Survey (USGS) Comal Springs gauging station (#08169000) increases by 5% or there is a 20% change in three of the five water quality parameters measured in the downstream real time water quality monitoring probe. Samples will be collected from each stormwater sampling location during the sampling event.

Stormwater samples will be analyzed for the analytical parameters using the analytical methods provided in Table 1.

The following locations will be sampled for storm water (see attached map):

- Upper Springs (near Blieders Creek);
- New Channel - (below confluence with Dry Comal Creek);
- Upper Old Channel - (at Elizabeth Street);
- Lower Old Channel - (above Hinman Island); and,
- Comal River - (above confluence with Guadalupe River)

Subtask 1.4 Groundwater Sample Collection for Extreme Low Flow Scenarios Comal Springs

In the event total springflow at Comal Springs (as measured by USGS Comal Springs gauging station (#08169000)) drops below 30 cubic feet per second (cfs), the Contractor will conduct weekly monitoring of three wells in the vicinity of the spring complex for dissolved oxygen (DO), conductivity, pH, and temperature. Should springflow drop below 20 cfs, additional weekly sampling analyses will include nutrients, total dissolved solids (TDS), and total organic compounds (TOC). EAA staff will assist the Contractor in selecting three wells that will be used for sampling. Groundwater samples will be analyzed for the analytical parameters using the analytical methods provided in Table 2.

Based on conditions during the drought of record (circa 1950s), sampling for a lower flow could last for up to 21 weeks.

Subtask 1.5 Sediment Sampling

One subsurface sediment sampling event will be conducted each June at each of the surface water sampling locations. Three samples will be collected at each sample site and composited into one sample for analysis. Sediment samples will be analyzed for the analytical parameters using the analytical methods provided in Table 3.

The Contractor shall provide prior notification to EAA no later than 5 business days of intent to conduct a surface or sediment sampling event. The Contractor shall provide 24 hour prior notification to the EAA of the intent to mobilize for a potential stormwater sampling.

After each sampling event, the Contractor shall provide the data within one week of receipt from the Laboratory and indicate which parameters 1) have exceeded TCEQ surface water standards for contact recreation and ecological health for storm, well, PDS and surface water samples and 2) have exceeded Probable Effect of Concentration to Benthic Organisms (PEC) for sediment samples.

The Contractor shall ensure collection of sufficient number of samples and sample volume per laboratory requirements for water and sediment samples.

Task 2. San Marcos Springs

This task is divided into of several subtasks consisting of surface sampling, stormwater runoff sampling, groundwater sampling, subsurface sediment sampling, and passive diffusion sampling.

Subtask 2.1 Surface Water Sampling Locations

The Contractor will collect grab samples from the seven surface water sampling locations (see attached map), twice during the calendar year, approximately six months apart. Samples will be collected in March and August. Grab samples will be analyzed for the analytical parameters using the analytical methods provided in Table 1.

Subtask 2.2 Surface Water Passive Sampling

The Contractor will perform six sampling events using passive diffusion samplers (PDS) manufactured by Amplified Geochemical Imaging, LLC (or equivalent). One PDS will be placed in each of the sampling locations identified in the attached map for the San Marcos River. The PDS will be left in place for two weeks at each location. The sampling events will occur in February, April, June, August, October, and December.

All analyses, other than those provided for PDS's and provided by Amplified Geochemical Imaging, LLC. will be conducted by a National Environmental Laboratory Accreditation Program (NELAP) laboratory.

Sample sites in the Spring Lake and San Marcos river area are listed below: (also see attached map)

- Sink Creek;
- Spring Lake;
- Sessoms Creek;
- City Park;
- Rio Vista Dam;
- I-35 reach; and
- Capes Dam

Subtask 2.3 Storm Water Sampling

Two storm water sampling events will be performed each year. The Contractor shall schedule these sampling events so that they are approximately six months apart and are representative of different seasons of the year (preferably winter and summer). It is understood that this sampling is dependent on rainfall events; if it becomes apparent that this criteria for a sampling schedule is unable to be met, the Contractor shall propose a new sampling schedule to EAA staff to be approved by EAA. A storm water sampling event will be triggered when the flow rate at the USGS San Marcos Springs gauging station (#08170500) increases by 5% or there is a 20% change in three of the five water quality parameters measured in the downstream real time water quality monitoring probe. Samples will be collected and analyzed from each stormwater sampling location during the sampling event.

The following locations will be sampled for storm water (see attached map):

- Sink Creek;
- Sessoms Creek;
- Dog Beach Outflow;
- Hopkins Street Outflow;
- Purgatory Creek (above San Marcos River);
- I-35 Reach; and
- Willow Creek (above San Marcos River)

Subtask 2.4 Groundwater Sample Collection for Extreme Low Flow Scenarios for San Marcos Springs

In the event total springflow at San Marcos Springs (as measured by USGS San Marcos Springs gauging station (#08170500)) drops below 30 cubic feet per second (cfs), the Contractor will conduct weekly monitoring of three wells in the vicinity of the spring complex for dissolved oxygen (DO), conductivity, pH, and temperature. Should springflow drop below 20 cfs, then additional weekly sampling analyses will include nutrients, total dissolved solids (TDS), and total organic compounds (TOC). The EAA will assist the Contractor in selecting three wells that will be used for sampling. Groundwater samples will be analyzed for the analytical parameters using the analytical methods provided in Table 2.

Based on conditions during the drought of record (circa 1950s), sampling for a lower flow scenario could last for up to 21 weeks.

Subtask 2.5 Sediment Sampling

One subsurface sediment sampling event will be conducted each June at each of the surface water sampling locations. Three samples will be collected at each sample site and composited into one sample for analysis. Sediment samples will be analyzed for the analytical parameters using the analytical methods provided in Appendix C. Results of sediment sampling analysis will be used to formulate future sediment sampling at Spring Lake and the San Marcos River.

The Contractor shall provide prior notification to EAA no later than 5 business days of intent to conduct a surface or sediment sampling event. The Contractor shall provide 24 hour prior notification to the EAA of the intent to mobilize for a potential stormwater sampling.

After each sampling event, the Contractor shall provide the data within one week of receipt from the Laboratory and indicate which parameters 1) have exceeded TCEQ surface water standards for contact recreation and ecological health for storm, well, PDS and surface water samples and 2) have exceeded Probable Effect of Concentration to Benthic Organisms (PEC) for sediment samples.

The Contractor shall ensure collection of sufficient number of samples and sample volume per laboratory requirements for water and sediment samples.

Table 1: Analytical Parameters for Assessing Water Quality from Storm Water and Surface Water Locations, Comal and San Marcos Springs

Analyses
Volatile Organic Compounds (VOCs)
Semi-volatile Organic Compounds (SVOCs)
Organochlorine Pesticides
Polychlorinated Biphenyls (PCBs)
Organophosphorous Pesticides
Herbicides
Metals (Al, Sb, As, Ba, Be, Cd, Cr (total), Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, Tl, and Zn)
General Chemistry (GWQP) Total Alkalinity (as CaCO ₃), Bicarbonate Alkalinity (as CaCO ₃), Carbonate Alkalinity (as CaCO ₃); (Cl, Br, NO ₃ , SO ₄ , F ⁻ , pH, TDS, TSS, Ca, Mg, Na, K, Si, Sr, CO ₃), and Total Suspended Solids (TSS).
Phosphorus (total)
Total Organic Carbon (TOC),
Dissolved Organic Carbon (DOC)
Kjeldahl Nitrogen
Bacteria Testing (<i>E coli</i>)
Caffeine

Table 2: Analytical Parameters for Critical Period Related (Low Flow) Sampling of Water Wells, Comal and San Marcos Springs

Analyses
General Chemistry (GWQP) Total Alkalinity (as CaCO ₃), Bicarbonate Alkalinity (as CaCO ₃), Carbonate Alkalinity (as CaCO ₃); (Cl, Br, NO ₃ , SO ₄ , F ⁻ , pH, TDS, TSS, Ca, Mg, Na, K, Si, Sr, CO ₃),
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)

Table 3: Analytical Parameters for Assessing Water Quality from Sediment Sample Locations, Comal and San Marcos Springs

Analyses
Volatile Organic Compounds (VOCs)
Semi-volatile Organic Compounds (SVOCs)
Organochlorine Pesticides
Polychlorinated Biphenyls (PCBs)
Organophosphorous Pesticides
Herbicides
Metals (Al, Sb, As, Ba, Be, Cd, Cr (total), Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, Tl, and Zn)
General Chemistry Total Alkalinity (as CaCO ₃), Bicarbonate Alkalinity (as CaCO ₃), Carbonate
Phosphorus (total)
Total Organic Carbon (TOC),
Dissolved Organic Carbon (DOC)

Table 4: Method Descriptions

Method	Method Description	Protocol¹
8260B	Volatile Organic Compounds	(GC/MS) SW846
8270C	Semivolatile Organic Compounds	(GC/MS) SW846
8081B	Organochlorine Pesticides	(GC) SW846
8082A	Polychlorinated Biphenyls (PCBs)	by Gas Chromatography SW846
8141A	Organophosphorous Pesticides	(GC) SW846
8151A	Herbicides	(GC) SW846
6010B	Metals	(ICP) SW846
6020	Metals	(ICP/MS) SW846
7470A	Mercury	(CVAA) SW846
300.0	Anions,	Ion Chromatography
340.2	Fluoride	MCAWW
365.4	Phosphorus,	Total EPA
9040C	pH	SW846
9060	Organic Carbon,	Total (TOC) SW846
SM 2320B	Alkalinity	SM
SM 2540C	Solids,	Total Dissolved (TDS) SM
SM 2540D	Solids, Total Suspended (TSS)	SM
351.2	Nitrogen, Total Kjeldahl	MCAWW
E1694	Caffeine	(HPLC/MS/MS) EPA

Task 3. Conclusions and Recommendations

¹ **Protocol References:**

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

The Contractor will summarize observations regarding sample site locations, frequency of samples, number of samples, data results, and trends. The Contractor will discuss conclusions based on these items and provide recommendations to the EAA for consideration in the following year.

Task 4. Draft and Final Annual Reports

No later than November 1st of each calendar year, , the Contractor shall submit to the EAA two (2) copies of the draft project report. The report will include an evaluation of analytical data, graphs of water quality laboratory and field data sheets, photographs, sampling locations and rationale, description of sampling methods, and a description and rationale for any minor deviations from the Scope of Work due to logistics or safety issues.

After receipt and incorporation of the EAA's review comments, the Contractor will submit the final report to the EAA on or before December 31st of each calendar year.

Task 5. Meetings and Presentations

The Contractor will present the project results to the Implementing Committee on or about December of each calendar year and additionally when requested by the EAHCP Program Manager.

PROJECT REQUIREMENTS

A. No later than February 15, and each month thereafter, the Contractor shall submit a monthly "invoice packet" to the EAA for each previous month's activities. Each invoice packet shall contain, at a minimum:

- (1) A progress report containing:
 - a description of the work completed in each Task during the billing cycle;
 - a monthly update of the work schedule as it relates to achievement of the deliverables;
 - an estimate of the percent completion of each Task;
 - a discussion of any issues or problems that may result in a change in the deliverable due date;
- (2) Documentation of all costs and expenses incurred during the billing cycle, supporting documentation; and
- (3) A certified invoice summary sheet.

B. The monthly invoice packet will be submitted electronically in Adobe Acrobat (pdf) format via email to the Senior HCP Coordinator.

C. Data Submission, Statement of Assumptions, Project Notebook

- (1) All spreadsheets, laboratory data sheets, QA/QC verification, field sample sheets, and project notebooks developed as a part of this project, are due on the same date as the final report.
- (2) All analytical data collected and/or generated during this study shall be submitted to the EAA in an electronic format which will be provided to the Contractor. Data shall be delivered via pre-approved digital media and shall be labeled to provide sufficient detail to access the information.
- (3) All databases, and spreadsheets developed herein (written and digital formats) are due on the same date as the final report.
- (4) To facilitate the EAA's accurate evaluation of the Contractor's work product, computations, conclusions and recommendations, the Contractor shall:
 - Prepare a project notebook containing a description of the assumptions and methodologies used in the study analysis. The notebook shall be organized in such a way as to allow replication of the steps, calculations, and procedures used by the Contractor to reach conclusions, described in the draft final report. The project notebook shall be submitted with the draft final report.

D. The Contractor shall take digital photographs throughout the term of the study representative of each task. Digital photos shall be submitted with the draft final report.