



# Offer and Acceptance

State of Arizona  
State Procurement Office  
100 N. 15<sup>th</sup> Ave. Suite 201  
Phoenix, AZ 85007

SOLICITATION NO.: ADSP016-00005912 Request  
for Qualifications: 2016 Annual Professional  
Services List

PAGE  
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Offeror: Oxbow Ecological Engineering, LLC

OF  
1

## OFFER

### TO THE STATE OF ARIZONA:

The Undersigned hereby offers and agrees to furnish the material, service or construction in compliance with all terms, conditions, specifications and amendments in the Solicitation and any written exceptions in the offer. Signature also certifies Small Business status.

Oxbow Ecological Engineering, LLC

Company Name

3080 S. Walkup Drive

Address

Flagstaff

AZ

86005

City

State

Zip

george@oxbow-eco-eng.com

Contact Email Address

Signature of Person Authorized to Sign Offer

George F. Cathey

Printed Name

Owner/Principal Engineer

Title

Phone: (928) 266-6192

Fax: NA

By signature in the Offer section above, the Offeror certifies:

1. The submission of the Offer did not involve collusion or other anticompetitive practices.
2. The Offeror shall not discriminate against any employee or applicant for employment in violation of Federal Executive Order 11246, State Executive Order 2009-9 or A.R.S. §§ 41-1461 through 1465.
3. The Offeror has not given, offered to give, nor intends to give at any time hereafter any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a public servant in connection with the submitted offer. Failure to provide a valid signature affirming the stipulations required by this clause shall result in rejection of the offer. Signing the offer with a false statement shall void the offer, any resulting contract and may be subject to legal remedies provided by law.
4. The Offeror certifies that the above referenced organization  IS/  IS NOT a small business with less than 100 employees or has gross revenues of \$4 million or less.

## ACCEPTANCE OF OFFER

The Offer is hereby accepted.

The Contractor is now bound to sell the materials or services listed by the attached contract and based upon the solicitation, including all terms, conditions, specifications, amendments, etc., and the Contractor's Offer as accepted by the State.

This Contract shall henceforth be referred to as Contract No. ADSP016-00005912

The effective date of the Contract is March 1, 2016

The Contractor is cautioned not to commence any billable work or to provide any material or service under this contract until Contractor receives purchase order, contract release document or written notice to proceed.

State of Arizona  
Awarded this 29 day of February 2016

Procurement Officer



**ATTACHMENT I – General Qualifications**  
**ANNUAL REQUEST FOR QUALIFICATIONS AND EXPERIENCE NO:**  
**ADSP016-00005912**

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**100 North 15<sup>th</sup> Avenue, Suite 201**  
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*(If a firm has branch offices, complete for each specific branch office seeking work.)*

**1. Annual Request for Qualifications**

a. FIRM (OR BRANCH OFFICE ) NAME:	Oxbow Ecological Engineering, LLC
b. FIRM (OR BRANCH OFFICE) STREET:	3080 S. Walkup Drive
c. FIRM (OR BRANCH OFFICE) CITY:	Flagstaff
d. FIRM (OR BRANCH OFFICE) STATE:	AZ
e. FIRM (OR BRANCH OFFICE) ZIP CODE:	86005

f. YEAR ESTABLISHED:	2013
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(g1). OWNERSHIP - TYPE:	Single Member LLC
(g2) OWNERSHIP - SMALL BUSINESS STATUS:	Small Business

h. POINT OF CONTACT NAME AND TITLE:	George F. Cathey, Owner/Principal Engineer
i. POINT OF CONTACT TELEPHONE NUMBER:	(928) 266 6192
j. POINT OF CONTACT E-MAIL ADDRESS:	george@oxbow-eco-eng.com

k. NAME OF FIRM (If block 1a is a branch office):	
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**3. PROFILE OF FIRM'S EXPERIENCE AND ANNUAL AVERAGE REVENUE FOR LAST YEAR**

a. Approximate No. of Projects	b. Experience	c. Revenue Index Number <i>(see below)</i>
<b>4</b>	<b>Area Master Planning</b>	<b>1</b>
<b>11</b>	<b>Conservation and Resource Management</b>	<b>1</b>
<b>4</b>	<b>Cost Estimating; Cost Engineering and Analysis; Parametric Costing</b>	<b>1</b>
<b>6</b>	<b>Dams (Earth; Rock); Dikes; Levees</b>	<b>1</b>
<b>11</b>	<b>Digital Elevation and Terrain Model Development</b>	<b>1</b>
<b>8</b>	<b>Irrigation; Drainage</b>	<b>1</b>
<b>3</b>	<b>Plumbing and Piping Design</b>	<b>1</b>
<b>2</b>	<b>Recreation Facilities (Parks, Marinas, Etc.)</b>	<b>1</b>
<b>11</b>	<b>Sustainable Design</b>	<b>1</b>
<b>3</b>	<b>Storm Water Handling and Facilities</b>	<b>1</b>
<b>3</b>	<b>Specifications Writing</b>	<b>1</b>
<b>2</b>	<b>Topographic Surveying and Mapping</b>	<b>1</b>
<b>6</b>	<b>Water Resources; Hydrology; Groundwater</b>	<b>1</b>

**PROFESSIONAL SERVICES REVENUE INDEX NUMBER**

- |   |   |
|---|---|
| 1. Less than \$100,000                  | 6. \$2 million to less than \$5 million   |
| 2. \$100,000 to less than \$250,000     | 7. \$5 million to less than \$10 million  |
| 3. \$250,000 to less than \$500,000     | 8. \$10 million to less than \$25 million |
| 4. \$500,000 to less than \$1 million   | 9. \$25 million to less than \$50 million |
| 5. \$1 million to less than \$2 million | 10. \$50 million or greater               |



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**4. Resumes of Key Personnel Proposed for this Contract** *(Complete one Section 4 for each key person.)*

<b>a. NAME</b> <b>George F. Cathey</b>	<b>b. ROLE IN THIS CONTRACT</b> <b>Principal Engineer/ Project Manager</b>	<b>c. YEARS EXPERIENCE</b>	
		<b>1. TOTAL</b> <b>12 years</b>	<b>2. WITH CURRENT FIRM</b> <b>2.5 years</b>
<b>d. LOCATION (City and State)</b> <b>Flagstaff, AZ</b>			
<b>e. EDUCATION (DEGREE AND SPECIALIZATION)</b> <b>M.S. Civil Engineering (Environmental Emphasis)</b> <b>B.S. Civil Engineering</b>		<b>f. PROFESSIONAL TRAINING - REGISTRATIONS</b> <b>Registered Professional Engineer in AZ, CA, CO, NM, NV, TX, UT</b>	

**g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)**  
**Completed David Rosgen's Wildland Hydrology Short Courses: Applied Fluvial Geomorphology (Level I), River Morphology and Applications (Level II), River Assessment and Monitoring (Level III), and River Restoration and Natural Channel Design (Level IV), Bill Zeedyk Erosion Control Workshop, Arizona Floodplain Management Association HEC-RAS Short Course, Trimble RTK GPS Survey Training**

**H. RELEVANT PROJECTS**

	(1) TITLE AND LOCATION <i>(City and State)</i>	(2) YEAR COMPLETED	
<b>1.</b>	<b>Storm Water Management Improvements, Arroyo Chamiso &amp; Santa Fe River (Santa Fe, NM)</b>  <b>(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE</b> <b>As the Lead Engineer, completed work on an assessment and conceptual design for a large head-cut located in an urban area along the Santa Fe River. Work included a detailed supplemental survey, preliminary hydrologic/hydraulic analysis, boulder step-pool design and a conceptual site improvement plan for review by local and federal permitting agencies.</b>	Professional Services <b>2015</b>	Construction (if applicable) <b>2015</b>
		<input checked="" type="checkbox"/> Check if project performed with current firm	
<b>2.</b>	<b>Nitsin Canyon &amp; Betatakin Canyon Stream Restoration Project (Navajo National Monument, Arizona)</b>  <b>(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE</b> <b>As the Lead Engineer, completed work on an assessment and conceptual design for two ecologically and geomorphically impaired stream reaches located near Navajo National Monument within the Navajo Nation. Calculated hydrological parameters for both sites, including peak discharge, flood frequency, and bankfull flow ranges. Completed a report of the site assessment and findings, including conceptual plans and cost estimates.</b>	Professional Services <b>2015</b>	Construction (if applicable)
		<input checked="" type="checkbox"/> Check if project performed with current firm	
<b>3.</b>	<b>B.J. Bishop Wetland Restoration Project (Presidio, TX)</b>  <b>(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE</b> <b>As the Engineer of Record, completed all analysis, design, and construction documents (drawings, specifications, engineer's estimate &amp; quantity take-offs) for a new wetland and riparian complex. The design included site grading, a water delivery pipeline, erosion protection, and water control improvements.</b>	Professional Services <b>2014</b>	Construction (if applicable) <b>2015</b>
		<input checked="" type="checkbox"/> Check if project performed with current firm	
<b>4.</b>	<b>Vermejo Park Ranch Geomorphic Stream Assessment &amp; Design (Raton, NM)</b>  <b>(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE</b> <b>As the Lead Engineer, completed field work and a geomorphic assessment for a 2,800 foot long impaired stream reach. As part of the assessment, completed geomorphic long profile and cross-sections, topographic surveys, pebble counts, and bar samples for the impaired reach and two reference reaches. Completed conceptual designs for stream improvements.</b>	Professional Services <b>2015</b>	Construction (if applicable)
		<input checked="" type="checkbox"/> Check if project performed with current firm	
<b>5.</b>	<b>Spencer Abandoned Uranium Mine Reclamation &amp; Stormwater Improvement Project (Grants, NM)</b>  <b>(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE</b> <b>As the Lead Engineer, completed all field work, analysis, design, and 100% construction documents (drawings, specifications, engineer's estimate &amp; quantity take-offs) for the reclamation and restoration of an alluvial fan complex damaged by a gully initiated by an abandoned uranium mine shaft that is capturing stormwater flows. Work included a detailed supplemental survey, hydrologic/hydraulic analysis, &amp; regenerative erosion control design to restore natural alluvial fan morphology &amp; function.</b>	Professional Services <b>2015</b>	Construction (if applicable) <b>On-going</b>
		<input checked="" type="checkbox"/> Check if project performed with current firm	



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**5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT**

*(Present no more than five (5) projects. Complete one Section 5 for each project.)*

a. TITLE AND LOCATION <i>(City and State)</i>  <b>Laguna Division Conservation Area Wetland Restoration Project (Yuma, Arizona)</b>	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES  <b>2014</b>	CONSTRUCTION <i>(If applicable)</i>

**23. PROJECT OWNER'S INFORMATION**

c. PROJECT OWNER <b>U.S. Bureau of Reclamation in partnership with the Lower Colorado Multi-Species Conservation Program (LCR-MSCP)</b>	d. DOLLAR AMOUNT OF PROJECT <b>\$440,000 (estimated for design only)</b>	e. TOTAL COST OF PROJECT <b>\$25 Million (estimated for design, construction, &amp; revegetation)</b>
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

**Project Partners:**

Lower Colorado River Multi-Species Conservation Program (LCR-MSCP) & U.S. Bureau of Reclamation (USBR) Provo Area Office, Yuma Area Office, & Technical Service Center

**Technical Consultants:**

Natural Channel Design, Inc. & Fred Phillips Consulting, LLC

**Project Synopsis:**

As part of the Lower Colorado River Multi-Species Conservation Program (LCR-MSCP), the Bureau of Reclamation is undertaking a 1,250 acre habitat restoration project along a historic reach of the Lower Colorado River, between Imperial and Laguna Dams, near Yuma Arizona. As part of this landscape scale project, large stands of invasive salt cedar (*Tamarix* spp.) that are pervasive throughout the area will be removed, the site will be re-contoured to optimize water use and habitat, and a mosaic of native wetland, riparian and upland vegetation will be planted. Water will be conveyed to the wetlands by a new water delivery system that is to be constructed as part of the restoration project. Once water reaches the wetlands it will be managed with a series of large automated water control structures based on seasonal habitat and wildlife needs. The resulting wetland complex is expected to attract many migratory birds and increase acreage for several threatened and endangered native birds and mammals. Construction on the project began in 2011 and is expected to be completed in 2015.

**Technical Contribution by George F. Cathey, P.E. as an employee of Natural Channel Design, Inc. (previous employer):**

- Engineer of Record and lead designer for all civil works associated with the restoration project.
- Permitting Assistance – Coordinated with the USBR on the Army Corps of Engineers (USACE) Jurisdictional delineation and federal NEPA compliance, and aided with the development of all documents for the ACE 404 permit and Stormwater Pollution Prevention Plan (SWPPP). Coordinated closely with USBR State Historic Preservation Office (SHPO) representatives to align the water delivery pipeline such that cultural resources from the WWII era Yuma Test Branch were not impacted.
- Water Delivery System Survey and Design - Completed all topographic corridor surveys, modeling, and analysis for a 2,600 foot long, 48-inch diameter HDPE pipeline and associated cast-in-place concrete headworks and outlet works facilities to deliver water to the wetland complex. Pipeline design included detailed hydraulic analysis, ring deflection, ring compression, & ring buckling analysis for HDPE pipe, buoyancy calculations, design for combination air/vacuum and air release valves, and design of custom fabricated fusion weld HDPE pressure manholes. The headworks design included finite element analysis and seismic analysis of the cast-in-place reinforced concrete facilities, specifications for an automated flow meter & control gate and also slide gates, and design of a custom fabricated stainless steel spool embed for the HDPE pipeline connection.
- Wetland Design - Provided all analysis for the grading and water control plan including earth balance calculations for ~1.5 million cubic yards of proposed earthwork, structural concrete calculations for cast-in-place concrete facilities designed to house the water control gates, specifications for the automated, solar powered, SCADA equipped wetland water control overshot gates, and the development of preliminary seasonal water maintenance hydrographs.
- Construction Packages – Completed and sealed the construction packages (specifications, drawings, calculations, and quantity take-offs) for the water delivery system plan, invasive species removal plan, habitat re-contouring plan, and water control structure plan.
- Revegetation Plan Collaboration – Coordinated and collaborated with Fred Phillips Consulting, Inc., as needed, as part of the development of the grading and revegetation plan.
- Client Coordination and Design Review – Acted as the technical liaison to the LCR-MSCP and provided progress reports and presentations to regional offices of the USBR that were part of the design review team.
- Contractor Collaboration - Worked closely with the general construction contractor chosen for the project during the design phase, and recommendations regarding constructability were incorporated into the final plans.
- Construction Phase Services – Provided construction administration services including observation and RFI responses.



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a. TITLE AND LOCATION <i>(City and State)</i> <b>Gila River Restoration Project (Apache Grove, AZ)</b>	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES	CONSTRUCTION <i>(If applicable)</i>
	<b>2012</b>	<b>2012</b>

**23. PROJECT OWNER'S INFORMATION**

c. PROJECT OWNER <b>Gila Watershed Partnership in partnership with Arizona Water Protection Fund</b>	d. DOLLAR AMOUNT OF PROJECT <b>\$188,115 (estimated for design, construction administration, &amp; monitoring)</b>	e. TOTAL COST OF PROJECT <b>\$735,000 (estimated for design, construction administration, construction, &amp; monitoring)</b>
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

**Project Partners:**

Arizona Water Protection Fund, Barney Land & Cattle, Gila Watershed Partnership, U.S. Fish & Wildlife Service Partners for Fish and Wildlife Program, Greenlee County Engineering

**Technical Consultants:**

Natural Channel Design, Inc.

**Project Synopsis:**

The Gila River Restoration Project at Apache Grove was developed in response to recommendations of a report from a previously funded Arizona Water Protection Fund (AWPF) project titled, "Upper Gila River Fluvial Geomorphology Study" (AWPF Grant Number 98-054WPF). The Gila River Restoration Project at Apache Grove focused on a 1.6-mile long reach of the Gila River on 200-acres of private farm and ranch land near Duncan, AZ. Objectives of the project include restoring natural floodplain function by removing existing partially breached agricultural dikes, reducing the risks of lateral erosion and land loss, managing salt cedar, and improving riparian habitats and stream function. Proper stream geomorphology/channel characteristics will be restored by allowing the main channel to reattach to its former floodplain thereby restoring floodplain conditions within the project area. This project includes excavating 3,000 feet of earthen dikes and returning the ground to natural grade and re-contouring the floodplain to add floodprone width to the river. Other proposed practices include implementation of bank stabilization measures, invasive vegetative species management, native species revegetation, monitoring, fencing, and development of a public outreach plan.

**Technical Contribution by George F. Cathey, P.E. as an employee of Natural Channel Design, Inc. (previous employer):**

- Topographic/Geomorphic Survey – Coordinated and conducted a supplemental survey of the river reach using a survey grade RTK GPS system to augment the photogrammetric data of the site with additional topographic and geomorphic data (profiles, cross-sections, and bankfull features).
- Permitting Assistance – Assisted the development of the permitting package for the project including USACE 404 permit, ADEQ 401 Certification and Stormwater Pollution Prevention Plan (SWPPP).
- Hydrologic and Hydraulic Modeling - Evaluated local and regional hydrology to develop flood frequencies/recurrence intervals and associated flows. Evaluated flooding under existing conditions and proposed conditions (with the removal of invasive vegetation, removal of the dike, and floodplain re-contouring operations) using vegetation mapping data, geomorphic criteria, and a detailed HEC-RAS/RiverCAD model. The 10, 25, 50, and 100-year flood extents were determined as part of the study.
- Grading Design - Provided analysis for the grading plan including earth balance calculations for ~64,000 cubic yards of proposed earthwork from dike removal, floodplain re-contouring, and bank stabilization operations. The final plan optimized earthwork while improving geomorphic characteristics of the river and its floodplain. Spoils from the earthmoving were used to re-level and improve drainage on existing agricultural fields adjacent to the project.
- Construction Package – Developed the construction package (specifications, drawings, engineer's opinion of probable cost, and unit price table) for the Stormwater Pollution Prevention Plan (SWPPP), site preparation and invasive species management plan, and the earthwork plan including dike removal and floodplain re-contouring operations.
- Construction Phase Services - Led pre-bid and pre-construction meetings for grading operations, developed a staking plan for the earthmoving operations, laid out the construction using a survey grade RTK GPS system, and coordinated with the contractor on construction progress and grade checking.



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a. TITLE AND LOCATION <i>(City and State)</i> <b>Hunter's Hole Riparian and Wetland Restoration Project (Gadsden, AZ)</b>	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES	CONSTRUCTION <i>(If applicable)</i>
	<b>2012</b>	<b>2012</b>

**23. PROJECT OWNER'S INFORMATION**

c. PROJECT OWNER <b>Yuma Crossing National Heritage Area in partnership with Arizona Water Protection Fund</b>	d. DOLLAR AMOUNT OF PROJECT <b>\$39,285 (estimated for engineering services only)</b>	e. TOTAL COST OF PROJECT <b>\$683,000 (estimated for design, construction, &amp; revegetation)</b>
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

**Project Partners:**

Arizona Water Protection Fund, Yuma Crossing National Heritage Area, Lower Colorado River Multi-Species Conservation Program (LCR-MSCP), U.S. Bureau of Reclamation (USBR) Yuma Area Office, & Bureau of Land Management

**Technical Consultants:**

Fred Phillips Consulting, LLC & Natural Channel Design, Inc.

**Project Synopsis:**

Hunters Hole is located along the Colorado River, in Arizona, approximately three miles north of the US/Mexico border. Hunters Hole once consisted of a series of interconnected ponds with adjacent marsh and a few stands of cottonwood-willow. Water levels were maintained by groundwater, irrigation drain flows, and by a connecting channel to the main river channel. Unfortunately, the site has been degraded and most of the habitat lost due to declining water levels, establishment of invasive plant species, and wildfires. The Yuma Crossing National Heritage Area has secured funding from the Arizona Water Protection Fund to restore ~37 acres within the Hunters Hole area and the Lower Colorado Multi-Species Conservation Program has agreed to provide funding for the long-term maintenance. Restoration activities include: selective clearing of invasive reeds and salt cedar while leaving existing native trees, earthwork/re-contouring to optimize water use and habitat, installation of infrastructure to allow for managed flooding, and planting with native cottonwoods-willow, marsh plants, upland grasses, and honey mesquite. The restoration design is expected to attract native and migratory birds and wildlife species. This project not only meets restoration needs, but also incorporates international security needs, cost-sharing, and allows for continued lower Colorado River operations within this reach of the river.

**Technical Contribution by George F. Cathey, P.E. as an employee of Natural Channel Design, Inc. (previous employer):**

- Engineer of Record and lead designer for all civil works associated with the restoration project.
- Topographic Survey - Coordinated and conducted a topographic survey of the ~ 37 acre site using survey grade RTK GPS units.
- Irrigation System Design - Completed all analysis for a 1,695 foot long, 12-inch diameter HDPE pipeline to deliver water to the riparian/wetland complex. Pipeline design included detailed hydraulic analysis of the pipeline and existing pump system, ring deflection, ring compression, & ring buckling analysis for HDPE pipe, design for air/vacuum valves, preliminary design of custom fabricated irrigation manifold, and specifications for pre-cast concrete stop-log structures.
- Wetland/Riparian Design - Provided all analysis for the grading plan including earth balance calculations for ~36,000 cubic yards of proposed earthwork. The final plan optimized earthwork and water use while maintaining historic floodplain channel features of the Colorado River.
- Construction Package – Completed and sealed the construction package (specifications, drawings, engineer's opinion of probable cost, and unit price table) for the irrigation system plan, habitat re-contouring plan, and water control structure plan.
- Revegetation Plan Collaboration – Coordinated and collaborated with Fred Phillips Consulting, Inc., as needed, as part of the development of the grading and revegetation plan.
- Record Drawings – Coordinated and conducted a post-construction survey of topographic features and visible infrastructure within the project area and produced record drawings based on this survey.



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a. TITLE AND LOCATION <i>(City and State)</i> <b>Haigler Creek Fish Barrier Project (Haigler Creek, AZ)</b>	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES <p align="center"><b>2013</b></p>	CONSTRUCTION <i>(If applicable)</i>

**23. PROJECT OWNER'S INFORMATION**

c. PROJECT OWNER <b>Arizona Game &amp; Fish Department</b>	d. DOLLAR AMOUNT OF PROJECT <b>\$23,000 (Engineering/Design Services)</b>	e. TOTAL COST OF PROJECT <b>\$250,000 (Based on the Engineer's Estimate for implementing the project)</b>
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

**Project Partners:**

Arizona Game & Fish Department & Trout Unlimited

**Technical Consultants:**

Natural Channel Design, Inc.

**Project Synopsis:**

The Haigler Creek Fish Barrier Project site is located on private lands along Haigler Creek in Gila County, AZ. There is an existing wooden crib structure that is estimated to be 80 to 100 years old at the project site. The existing structure spans the creek and still operates as an irrigation diversion. The landowners and Arizona Game and Fish Department (AGFD) are interested in constructing a new timber structure to act as a barrier to the upstream migration of non-native rainbow and brown trout while still functioning as an irrigation diversion. After installation of the barrier, AGFD will renovate the upstream reach of Haigler Creek to remove non-native species and will then restock the reach with native Gila Trout.

**Technical Contribution by George F. Cathey, P.E. as an employee of Natural Channel Design, Inc. (previous employer):**

- Engineer of Record on the project. Combined research on historic timber dam construction techniques with finite element structural analysis, geomorphic, hydraulic, and hydrologic analysis, and trout jumping performance data to design a 14-foot tall and 50-foot wide timber fish barrier to protect a native Gila trout reintroduction area from the upstream migration of non-native trout.
- Topographic Survey – Completed a topographic design survey of the barrier footprint using RTK GPS equipment.
- Hydrologic and Hydraulic Modeling - Evaluated local and regional hydrology to develop peak flows and flood frequencies used in the barrier model. Calculated the barrier height based on an in-house hydraulic model that incorporated morphological stream parameters and trout jump height.
- Barrier Structural Analysis and Design – Designed a polymer coated timber barrier to prevent upstream migration of non-native trout at the 25-year flood, while withstanding structural loads (flood surcharge and submerged soil infill) exerted by the 100-year flood. The design was tested/verified using finite element analysis modeling software.
- Construction Package – Completed and sealed the construction package (specifications, drawings, and cost estimate) for the barrier.



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a. TITLE AND LOCATION (City and State) <b>Atturbury Wash Riparian Stewardship Project (Tucson, Arizona)</b>	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES <b>2013</b>	CONSTRUCTION (If applicable) <b>2013</b>

23. PROJECT OWNER'S INFORMATION

c. PROJECT OWNER <b>Tucson Audubon Society in partnership with the Arizona Water Protection Fund &amp; City of Tucson</b>	d. DOLLAR AMOUNT OF PROJECT <b>\$45,710 (Engineering/Design/Permitting Services)</b>	e. TOTAL COST OF PROJECT <b>\$391,000 (estimated for design, construction, &amp; revegetation)</b>
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

**Project Partners:**

Tucson Audubon Society, Arizona Water Protection Fund, & City of Tucson

**Technical Consultants:**

Natural Channel Design, Inc. & Dryland Solutions, Inc.

**Project Synopsis:**

Atturbury Wash, an ephemeral channel that meanders through Lincoln Regional Park in Tucson, is undergoing down-cutting and there has been die-off of native vegetation along the stream corridor. This die-off has coincided with the down-cutting and the ongoing drought and periods of abnormally high temperatures that have occurred in recent years. Conversely, upstream of Lincoln Park, within the Fred Enke Golf Course, excess sediment is being deposited due to a combination of over-widened golf cart crossings that decrease flow velocity and act as grade-control.

In order to address these problems, principles and methods of natural channel design were utilized to stabilize habitat conditions within the wash both in Lincoln Regional Park and the downstream portion of the golf course. The goals of the project are to stabilize the bed of the wash through installation of grade control at several locations and to prevent loss of the current distributary channel network that reduce high velocities and associated channel erosion. The adjustment will assist in inducing a stable rate of sediment transport with the result of reducing flow velocity and encouraging aggradation of sediment on the bed of the channel. Preventing further down-cutting will help preserve the already drought-stressed riparian vegetation.

**Technical Contribution by George F. Cathey, P.E. as an employee of Natural Channel Design, Inc. (previous employer):**

- Engineer of Record for all civil works associated with the restoration project.
- Topographic/Geomorphic Survey – Coordinated and oversaw a supplemental survey of the stream reach, conducted by EIT staff, using a survey grade RTK GPS system to augment the LIDAR data of the site with additional topographic and geomorphic data (profiles, cross-sections, and bankfull features).
- Permitting Assistance – Assisted the development of the permitting package for the project including USACE 404 permit, ADEQ 401 Certification, City of Tucson Floodplain Use Permit, and Stormwater Pollution Prevention Plan (SWPPP).
- Design – Coordinated with Dryland Solutions, Inc. on the design and placement of multiple stream and floodplain structures, including one rock dams, rock run-downs and Zuni-bowls, and boulder cross-vanes, vanes, and j-hooks.
- Construction & Permitting Package – Oversaw the development of the construction and permitting drawings and reports.
- Construction Phase Services – Developed a staking plan for the earthmoving operations in coordination with the contractor and laid out the construction using RTK GPS equipment.
- Record Drawings – Completed the as-built survey and associated Record Drawings of the constructed stream improvement project. Used RTK GPS equipment to survey all above ground/visible structures including rock cross-vanes, vanes, Zuni-bowls, and one-rock dams. Monumented and surveyed permanent cross-section monitoring locations. Drafted revisions and created Record Drawings for the project.



ATTACHMENT I -- General Qualifications

ANNUAL REQUEST FOR QUALIFICATIONS AND EXPERIENCE NO:  
ADSP016-00005912

STATE PROCUREMENT OFFICE  
Department of Administration  
100 North 15<sup>th</sup> Avenue, Suite 201  
Phoenix, Arizona 85007

6. ADDITIONAL INFORMATION

a. PROVIDE ANY ADDITIONAL INFORMATION YOU FEEL MAY BE NECESSARY TO DESCRIBE YOUR FIRMS QUALIFICATIONS. (ATTACH ADDITIONAL SHEETS AS NEEDED.)

Established in May 2013, Oxbow Ecological Engineering, LLC is an engineering consulting firm that specializes in restoring, enhancing, and conserving river, riparian, wetland, and wildland systems. Oxbow Ecological Engineering, LLC applies a comprehensive approach to assessment, analysis, design, and planning, and integrates civil engineering and ecological principles to create unique restoration and enhancement solutions.

Engineering Services:

- Topographic Design Surveys
- Feasibility Studies and Restoration Master Planning
- Fluvial Geomorphic Surveys & Assessments
- HEC-RAS Modeling and Analysis
- Water Delivery & Irrigation System Planning & Design
- Wetland Water Control Structure Hydraulic and Structural Analysis and Design
- River Restoration & Natural Channel Design
- Fish Barrier Hydrologic, Hydraulic, and Structural Analysis and Design
- Erosion Control, Bank Stabilization, & Bioengineering Design
- Wetland, Stream, & Riparian Restoration Grading Plans & Habitat Structure Details
- Exhibits and Preliminary Design Packages for Permitting & Funding
- Sealed Contract Document Packages, Including Reports, Drawings, Technical Specifications, and Engineer's Opinion of Probable Cost (EOPC), for Permitting & Construction

Construction Phase Services:

- Bid Ready Construction Contract Packages
- Pre-bid Meetings & Site Showings
- Pre-Construction Meetings
- Staking and Layout
- Construction Administration

Permit Assistance & Coordination Services:

- Stormwater Pollution Prevention Plans (SWPPP)
- U.S. Army Corps of Engineers (USACE) 404 Permits
- U.S. EPA Clean Water Act Section 401 Water Quality Certifications
- National Environmental Policy Act (NEPA)

Grant Assistance & Administration Services:

- Arizona Department of Water Resources - Arizona Water Protection Fund Grants
- U.S. Fish and Wildlife Service - Partner's for Fish and Wildlife Program Grants
- North American Wetlands Conservation Act (NAWCA) Grants

7. ANNUAL AVERAGE PROFESSIONAL SERVICES REVENUES OF FIRM FOR LAST 3 YEARS

a.	Percentage of Total Work Attributable to State, Federal and Municipal Government Work:	68%
b.	Percentage of Total Work Attributable to Non-Government Work:	32%

8. AUTHORIZED REPRESENTATIVE. The foregoing is a statement of facts.

Signature: \_\_\_\_\_

Date: 12/20/2015

Name: George F. Cathey

Title: Owner/Principal Engineer