CITY OF PRESCOTT
Everybody's Hometown

Professional Services Agreement

Development of a Big Chino Sub-basin Groundwater Flow Model Contract # 2017-246

WHEREAS, the City of Prescott (hereinafter referred to as "City") is in need of certain services; and

WHEREAS, the City has solicited Requests for Qualifications in accordance with State Law; and

WHEREAS, Golder Associates Inc. (hereinafter referred to as "Professional"), has expertise in providing hydrogeological modeling services.

NOW, THEREFORE, IN CONSIDERATION OF THE COVENANTS HEREIN CONTAINED, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged by each party to the other, it is hereby agreed as follows:

1. That Professional shall provide the services to the City in relation to the Development of a Big Chino Sub-basin Groundwater Flow Model as indicated in Exhibit "A" (Request for Statements of Qualifications and Scope of Work, Task and Fee Estimate, and Project Schedule) and as requested by the City of Prescott Public Works Director.
2. In addition to those services identified in Paragraph 1 above, the Professional shall also perform all subordinate tasks not specifically referenced in Paragraph 1, but necessary to the full and effective performance of the tasks specifically referenced.
3. The Professional shall provide sufficient qualified personnel to perform any and all services as required herein, including but not limited to inspections and preparation of reports, as reasonably requested by representatives of the City.
4. All services identified in Paragraphs 1 and 2 above shall be completed to the satisfaction of the City and shall be performed in compliance with the Professional's project schedule identified in the attached Exhibit "A".
5. The term of this Agreement shall be February 28, 2017 to March 31, 2020.
6. Notwithstanding the foregoing, this Agreement may be terminated by either party upon ten (10) days written notice, with or without cause or upon completion of services. If this Agreement is terminated, the Professional shall be paid for authorized services satisfactorily performed to the date of the Professional's receipt of such termination notice.
7. It is agreed by and between the parties that this Agreement incorporates the attached Exhibit "A" thereto as a part of this Agreement, and that the terms thereof shall be binding between the parties.

8. Pursuant to A.R.S. § 38-511, the City may cancel this Agreement, without penalty or further obligation, if any person significantly involved in initiating, negotiating, securing, drafting or creating the Agreement on behalf of the City is, at any time while the Agreement or any extension of the Agreement is in effect, an employee or agent of any other party to the Agreement in any capacity or a Professional to any other party of the Agreement with respect to the subject matter of the Agreement. In the foregoing event, the City further elects to recoup any fee or commission paid or due to any person significantly involved in initiating, negotiating, securing, drafting or creating this Agreement on behalf of the City from any other party to the Agreement arising as a result of this Agreement.

9. Any notices to be given by either party to the other must be in writing, and personally delivered or mailed by prepaid postage, at the following addresses:

Public Works Director	Golder Associates Inc.
City of Prescott	1430 W. Broadway Road, Suite 108
433 N. Virginia Street	Tempe, AZ 85282
Prescott, AZ 86301	(480) 966-0153

10. It is expressly agreed and understood by and between the parties that the Professional is an independent Contractor, and, as such, Professional shall not become a City employee, and is not entitled to payment or compensation from the City, or to any fringe benefits to which other City employees are entitled. As an independent Contractor, Professional further acknowledges that it is solely responsible for payment of any and all income taxes, FICA, withholding, unemployment insurance, or other taxes due and owing any governmental entity whatsoever as a result of this Agreement. As an independent Contractor, Professional further agrees that it will conduct itself in a manner consistent with such status, and that it will neither hold itself out nor claim to be an officer or employee of the City by reason thereof, and that it will not make any claim, demand or application to or for any right or privilege applicable to any officer or employee of the City, including, but not limited to, worker's compensation coverage, unemployment insurance benefits, social security coverage, or retirement membership or credit.

11. This Agreement is non-assignable by the Professional unless by sub-contract, as approved in advance by the City.

12. (A) The City shall pay to Professional a total sum of one million one hundred forty nine thousand three hundred dollars and no cents ($1,149,300.00) for all services specified in Sections 1 and 2 of this Agreement, as specified in Exhibit "A".

    (B) The foregoing sum includes payment for any and all services to be rendered by Professional or sub-contractors, which the Professional may employ for this Contract. It is expressly agreed by and between the parties that the Professional is solely responsible for any and all payment to such any other professionals or sub-contractors retained by the Professional.

    (C) Payment of the total amount provided for under Section 12 (A) shall not relieve Professional of its obligation to complete the performance of all those services specified in Sections, 1, 2, and 3. Should the City request in writing additional services beyond that specified in Sections 1, 2, and 3, then Professional shall charge and City shall pay Professional in accordance with Exhibit "A".

(D) Prior to the final payment to the Professional, the City shall deduct therefrom any and all unpaid privilege, license and other taxes, fees and any and all other unpaid monies due the City from the Professional, and shall apply to those monies to the appropriate accounts. Professional shall provide to the City any information necessary to determine the total amount(s) due.

(E) The Professional shall bill the City monthly for the fee due the Professional, based upon an hourly rate for work completed for each itemized task pursuant to this Agreement and Exhibit "A" during the billing period. City shall pay such billings within thirty (30) days of the date of their receipt.

13. This Agreement is the result of negotiations by and between the parties. Although it has been drafted by the Prescott City Attorney, it is the result of negotiations between the parties. Therefore, any ambiguity in this Agreement is not to be construed against either party.

14. This Agreement shall be construed under the laws of the State of Arizona.

15. All work products of the Professional for this Project are instruments of service for this Project only and shall remain the property of the City whether the Project is completed or not. All plans, drawings, specifications, data maps, studies and other information, including all copies thereof, furnished by the City shall remain the property of the City. They are not to be used on other work, and, with the exception of this Agreement, are to be returned to the City on request or at the completion of the work.

16. The parties hereto expressly covenant and agree that in the event of a dispute arising from this Agreement, each of the parties hereto waives any right to a trial by jury. In the event of litigation, the parties hereby agree to submit to a trial before the Court. The Professional further agrees that this provision shall be contained in all sub-contracts related to the project, which is the subject of this Agreement.

17. The parties hereto expressly covenant and agree that in the event of litigation arising from this Agreement, neither party shall be entitled to an award of attorney fees, either pursuant to the Agreement, pursuant to A.R.S. § 12-341.01(A) and (B), or pursuant to any other state or federal statute, court rule, case law or common law. The Professional further agrees that this provision shall be contained in all sub-contracts related to the project, which is the subject of this Agreement.

18. This Agreement represents the entire and integrated Agreement between the City and the Professional and supersedes all prior negotiations, representations or agreements, either written or oral. This Agreement may be amended only by written instrument signed by both the City and the Professional. Written and signed amendments shall automatically become part of the Agreement, and shall supersede any inconsistent provision therein; provided, however, that any apparent inconsistency shall be resolved, if possible, by construing the provisions as mutually complementary and supplementary.

19. In the event any provision of this Agreement shall be held to be invalid and unenforceable, the remaining provisions shall be valid and binding upon the parties. One or more waivers by either party of any provision, term, condition or covenant shall not be construed by the other party as a waiver of a subsequent breach of the same by the other party.

20. The Professional hereby agrees to indemnify and hold harmless the City, its departments and divisions, its employees and agents, from any and all claims, liabilities, expenses or lawsuits

as a result of the Professional's negligent acts, errors, or omissions, pursuant to this Agreement, except to the extent said claims, liabilities, expenses or lawsuits arise by the negligent acts or omissions of the City or his/her agents. The Professional further releases and discharges the City, its departments and divisions, its agents and employees, and any and all persons legally responsible for the acts or omissions of the City, from any and all claims which the Professional has or may have against the City, its agents or employees, arising out of or in any way connected with the Professional's activities as set forth below, other than those acts which occur due to the negligence of the City, its employees or agents.

21. No oral order, objection, claim or notice by any party to the other shall affect or modify any of the terms or obligations contained in this Agreement, and none of the provisions of this Agreement shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or modification thereof in writing. No evidence of modification or waiver other than evidence of any such written notice, waiver or modification shall be introduced in any proceeding.

22. (A) Changes in Work: The City, without invalidating the Contract, may order extra work, make changes by altering, or delete any portion of the work as specified herein, or as deemed necessary or desirable by the Public Works Director. All such work shall be executed under the conditions of the original Contract except that any claim for extension of time and additional cost caused thereby shall be made at the time of ordering such change or extra work.

    (B) Extra work shall be that work not indicated or detailed on the Scope of Work and not specified. Such work shall be governed by all applicable provisions on the Contract Document.

    (C) In giving instructions, the Public Works Director shall have authority to make minor changes in the work, not involving extra cost, and not inconsistent with the purposes of the work. No extra work or change shall be made unless in pursuance of a written order by the Public Works Director and no claim for an addition to the total amount of the Contract shall be valid unless so ordered.

    (D) Payment for any change ordered by the Public Works Director which involves work essential to complete the Contract, but for which no basis of payment is provided for herein, shall be subject to agreement prior to said work being performed.

    (E) Adjustments to price and/or Contract Time which are agreed upon shall be incorporated in the written order issued by the Public Works Director, which shall be written so as to indicate acceptance on the part of the Professional as evidenced by its signature. In the event prices cannot be agreed upon, the City reserves the right to terminate the Contract as it applies to the items in question and make such arrangements as it may deem necessary to complete the work, or it may direct the Professional to proceed with the items in question to be reimbursed pursuant to the unit prices in the Professional's fee proposal.

    (F) If the Professional claims that any instructions involve extra cost under this Contract, it shall give the Public Works Director written notice thereof within forty-eight (48) hours after the receipt of such instructions, and in any event before proceeding to execute the work. No such claim shall be valid unless so made. The Professional shall do such extra work therefore upon receipt of an accepted Contract Amendment or other written order of the Public Works Director and in the absence of such Contract Amendment or other written order

of the Public Works Director, the Professional shall not be entitled to payment for such extra work. In no case shall work be undertaken without written notice from the Public Works Director to proceed with the work. All Contract Amendments must be approved by the Public Works Director. Contract Amendments over $10,000.00 must be approved by City Council.

23. (A) The Professional shall obtain and maintain in effect during the term of, and until final acceptance of all work under this Agreement, a policy or policies of liability insurance with the following coverage:

1) Commercial General Liability – Occurrence Form (if applicable)

Policy shall include bodily injury, property damage, personal injury, broad form contractual liability, and XCU coverage.

General Aggregate	$ 2,000,000
Products – Completed Operations Aggregate	$ 2,000,000
Personal and Advertising Injury	$ 1,000,000
Each Occurrence	$ 1,000,000
Fire Legal Liability (Damage to Rented Premises)	$ 100,000

The policy shall be endorsed to include the following additional insured language:

"The City of Prescott shall be named as an additional insured with respect to liability arising out of the activities performed by, or on behalf of the Professional."

2) Professional Liability (Errors and Omissions Liability)

Each Claim	$ 1,000,000
Annual Aggregate	$ 2,000,000

In the event that the professional liability insurance required by this Contract is written on a claims-made basis, Contractor warrants that any retroactive date under the policy shall precede the effective date of this Contract and that either continuous coverage will be maintained or an extended discovery period will be exercised for a period of two (2) years at the time work under this contract is completed.

The policy shall cover professional misconduct or lack of ordinary skill for those positions defined in the Scope of Work of this contract.

3) Business Automobile Liability (if applicable) Bodily Injury and Property Damage for any owned, hired, and/or non-owned vehicles used in the performance of this Contract.

Combined Single Limit (CSL)	$ 1,000,000

(B) City and Professional waive all rights against each other and their directors, officers, partners, commissioners, officials, agents, sub-contractors and employees for damages covered by property insurance during and after completion of the Services.

(C) All insurance required pursuant to this Agreement must be written by an insurance company authorized to do business in the State of Arizona, to be evidenced by a Certificate of Authority as defined in ARS § 20-217, a copy of which certificate is to be attached to each applicable bond or binder.

(D) Prior to commencing work under this Agreement, the Professional shall provide City with evidence that it is either a "self-insured employer" or a "carrier insured employer" for

Workers' Compensation as required by ARS 23-901 et seq., or that it employs no persons subject to the requirement for such coverage.

(E) Notice of Cancellation: With the exception of a ten (10) day notice of cancellation for non-payment of premium, any changes material to compliance with this contract in the insurance policies above shall require a thirty (30) day written notice.

(F) Acceptability of Insurers: Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A-VII, unless otherwise approved by the City of Prescott Risk Management Division. All insurance is to be placed with an insurer admitted in the state in which operations are taking place.

(G) Verification of Coverage: Professional shall furnish the City with certificates of insurance (ACORD form or equivalent approved by the City) as required by this Contract. The certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. Please note the contract number on the Certificate.

24. The Professional, with regard to the work performed by it after award and during its performance of this contract, will not discriminate on the grounds of race, color, national origin, religion, sex, disability or familial status in the selection and retention of sub-contractors, including procurement of materials and leases of equipment. The Professional will not participate either directly or indirectly in the discrimination prohibited by or pursuant to Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Section 109 of the Housing and Community Development Act of 1974, the Age Discrimination Act of 1975, the Americans With Disability Act (Public Law 101-336, 42 U.S.C. 12101-12213) and all applicable federal regulations under the Act, and Arizona Governor Executive Orders 99-4, 2000-4 and 2009-09 as amended.

25. Professional Immigration Warranty

Professional understands and acknowledges the applicability to it of the Americans with Disabilities Act, the Immigration Reform and Control Act of 1986 and the Drug Free Workplace Act of 1989. The following is only applicable to construction contracts: The Professional must also comply with A.R.S. § 34-301, "Employment of Aliens on Public Works Prohibited", and A.R.S. § 34-302, as amended, "Residence Requirements for Employees".

Under the provisions of A.R.S. § 41-4401, Professional hereby warrants to the City that the Professional and each of its sub-contractors ("Sub-contractors") will comply with, and are contractually obligated to comply with all Federal Immigration laws and regulations that relate to their employees and A.R.S. § 23-214(A) (hereinafter "Professional Immigration Warranty").

A breach of the Professional Immigration Warranty shall constitute a material breach of this Contract and shall subject the Professional to penalties up to and including termination of this Contract at the sole discretion of the City.

The City retains the legal right to inspect the papers of any Professional or Sub-contractors' employee who works on this Contract to ensure that the Professional or Sub-contractor is complying with the Professional Immigration Warranty. Professional agrees to assist the City in regard to any such inspections.

The City may, at its sole discretion, conduct random verification of the employment records of the Professional and any of Sub-contractors to ensure compliance with the Professional Immigration Warranty. Professional agrees to assist the City in regard to any random verification performed.

Neither the Professional nor any Sub-contractor shall be deemed to have materially breached the Professional Immigration Warranty if the Professional or Sub-contractor establishes that it has complied with employment verification provisions prescribed by Sections 274A and 274B of the Federal Immigration and Nationality Act and the E-Verify requirements prescribed by A.R.S. § 23-214, Subsection A.

The provisions of this Article must be included in any contract the Professional enters into with any and all of its Sub-contractors who provide services under this Contract or any sub-contract. "Services" are defined as furnishing labor, time or effort in the State of Arizona by a professional or sub-contractor. Services include construction or maintenance of any structure, building or transportation facility or improvement to real property.

26. Professional shall exercise the same degree of care, skill and diligence in the performance of the Services as is ordinarily possessed and exercised by a professional under similar circumstances.

27. Nothing in this Agreement shall be construed to give any rights or benefits to anyone other than the City and Professional.

28. In the event of a discrepancy between this Agreement and Exhibit "A", this Agreement shall control over Exhibit "A".

29. Non-Availability of Funds: Fulfillment of the obligation of the City under this Agreement is conditioned upon the availability of funds appropriated or allocated for the performance of such obligations. If funds are not allocated and available for the continuance of this Agreement, this Agreement may be terminated by the City at the end of the period for which the funds are available. No liability shall accrue to the City in the event this provision is exercised, and the City shall not be obligated or liable for any future payments as a result of termination under this paragraph.

Dated this 28 day of Feb., 2017.

City of Prescott, a municipal corporation:

Harry B. Oberg

Harry B. Oberg, Mayor

PROFESSIONAL:

Golder Associates Inc.

By: David A. Carr

Title: Associate and Senior Consultant

ATTEST:

Dana R. DeLong

Dana R. DeLong, City Clerk

APPROVED AS TO FORM:

Jon M. Paladini, City Attorney

MATTHEW PODRACKY, for

CERTIFICATE OF LIABILITY INSURANCE

5/1/2017

DATE (MM/DD/YYYY) 3/9/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	Lockton Companies 444 W. 47th Street, Suite 900 Kansas City MO 64112-1906 (816) 960-9000	CONTACT NAME:	
		PHONE (A/C, No, Ext):	FAX (A/C, No):
		E-MAIL ADDRESS:	
		INSURER(S) AFFORDING COVERAGE	NAIC #
		INSURER A : Zurich American Insurance Company	16535
INSURED 1404899	GOLDER ASSOCIATES INC. 3730 CHAMBLEE TUCKER ROAD ATLANTA GA 30341	INSURER B : Steadfast Insurance Company	26387
		INSURER C :	
		INSURER D :	
		INSURER E :	
		INSURER F :	

COVERAGES PARENT **CERTIFICATE NUMBER:** 14556235 **REVISION NUMBER:** XXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT LOC OTHER:	Y	N	GLO5393921	5/1/2016	5/1/2017	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 1,000,000 $ 5,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
A	AUTOMOBILE LIABILITY X ANY AUTO X OWNED AUTOS ONLY X HIRED AUTOS ONLY SCHEDULED AUTOS X NON-OWNED AUTOS ONLY	N	N	BAP5393920	5/1/2016	5/1/2017	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ XXXXXXX $ XXXXXXX $ XXXXXXX
	UMBRELLA LIAB OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $			NOT APPLICABLE			EACH OCCURRENCE AGGREGATE	$ XXXXXXX $ XXXXXXX
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	N	WC5393917	5/1/2016	5/1/2017	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
B	PROFESSIONAL LIABILITY	N	N	EEC5899096	5/1/2016	5/1/2017	$1,000,000 PER CLAIM $3,000,000 ANNUAL AGG	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: RE: P1662614 – PRESCOTT/BIG CHINO GW MODEL/AZ – PRESCOTT, AZ. CONTRACT NO. 2017-246. SEE ATTACHED

CERTIFICATE HOLDER

14556235
CITY OF PRESCOTT
PUBLIC WORKS DEPARTMENT
433 N. VIRGINIA STREET
PRESCOTT AZ 86301

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Joseph M Agnello

THE CITY OF PRESCOTT IS AN ADDITIONAL INSURED WITH RESPECT TO GENERAL LIABILITY, WITH RESPECT TO LIABILITY ARISING OUT OF THE ACTIVITIES PERFORMED BY, OR ON BEHALF OF GOLDER, AS REQUIRED BY WRITTEN CONTRACT. WAIVER OF SUBROGATION IN FAVOR OF THE CITY OF PRESCOTT APPLIES TO GENERAL LIABILITY, AS REQUIRED BY WRITTEN CONTRACT AND ALLOWED BY LAW. GENERAL LIABILITY INCLUDES XCU. GENERAL LIABILITY INCLUDES CONTRACTUAL LIABILITY COVERAGE, SUBJECT TO POLICY TERMS, CONDITIONS AND EXCLUSIONS. CERTIFICATE HOLDER WILL RECEIVE 30 DAYS NOTICE OF CANCELLATION ON THE GENERAL LIABILITY, AUTO AND WORKERS COMPENSATION, EXCEPT 10 DAYS NOTICE WILL BE PROVIDED IN THE EVENT OF NONPAYMENT OF PREMIUM.

RESOLUTION NO. 4374-1583

A RESOLUTION OF THE MAYOR AND COUNCIL OF THE CITY OF PRESCOTT, YAVAPAI COUNTY, ARIZONA, APPROVING CITY CONTRACT NO. 2017-246; AND AUTHORIZING THE MAYOR AND STAFF TO TAKE ANY AND ALL STEPS NECESSARY TO ACCOMPLISH THE ABOVE.

RECITALS:

WHEREAS, the City of Prescott has previously entered into Comprehensive Agreement No. 1 with the Salt River Project and the Town of Prescott Valley concerning groundwater in the Big Chino Sub-Basin; and

WHEREAS, the Comprehensive Agreement requires modeling of data collected to assess the interconnectivity of the Big Chino Sub-Basin and the Verde River and the extent of that connection; and

WHEREAS, the parties to the Comprehensive Agreement have selected a qualified technical contractor to conduct the modeling work via an appropriate procurement process.

ENACTMENTS:

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF PRESCOTT AS FOLLOWS:

Section 1 THAT, the City of Prescott hereby approves Contract No. 2017-246 for development of a Big Chino Sub-Basin groundwater flow model, as described in Exhibit "A", which is attached hereto and made a part hereof.

Section 2 THAT, the Mayor and Staff are hereby authorized to execute the said Contract, and to take any and all steps deemed necessary to accomplish the above.

PASSED, APPROVED AND ADOPTED by the Mayor and Council of the City of Prescott, Arizona, on this 28 day of Feb., 2017.

Harry B. Oberg

HARRY B. OBERG, Mayor

ATTEST:

DANA R. DeLONG
City Clerk

APPROVED AS TO FORM:

JON PALADINI
City Attorney

Golder Associates

February 2, 2017 P1662614

Benjamin Burns
Public Works Capital Projects Manager
City of Prescott
433 North Virginia Street
Prescott, Arizona 86302

RE: PROPOSAL FOR HYDROGEOLOGICAL MODELING SERVICES
BIG CHINO SUB-BASIN GROUNDWATER FLOW MODEL, ARIZONA

Dear Mr. Burns:

Golder Associates Inc. (Golder) has prepared this proposal for the Big Chino Sub-basin Groundwater Flow Model (BCSM) Project (Project) at the request of the Comprehensive Agreement No. 1 (CA#1) Steering Committee. This proposal was developed based on our understanding of the Project from the Request for Statements of Qualifications (RSOQ) and recent discussions with the Steering Committee in the interview on November 16, 2016, in the Pre-Scoping Submittal Meeting on December 5, 2016, and in our conference call on January 11, 2016. This proposal includes our proposed scope of work, cost estimate, and Project schedule, and supersedes our draft proposals dated December 28, 2016, January 27, 2017, and February 1, 2017.

1.0 PROJECT UNDERSTANDING

The purpose of the Project is to improve the understanding of the groundwater system in the Big Chino Sub-basin and surrounding area and to evaluate any potential impacts to groundwater and the Upper Verde Springs (UVS) from groundwater withdrawals from the Big Chino Sub-basin. The Project has been commissioned by the CA#1 Parties, which include the City of Prescott (City), Town of Prescott Valley (Town), and Salt River Valley Water Users Association and Salt River Project Agricultural Improvement and Power District (SRP). The City is the fiduciary agent for the CA#1 Parties and is responsible for contracting, payments, and other administrative matters.

2.0 SCOPE OF WORK

Our proposed scope of work for the project is consistent with the RSOQ and the draft scope of work that we discussed with the Steering Committee in the December 5, 2016 Pre-Scoping Submittal Meeting. The scope of work has been further refined by incorporating the Steering Committee's comments from the December 5, 2016 meeting and the January 11, 2017 conference call. The Steering Committee's comments are documented in the meeting minutes that were distributed on December 19, 2016 and January 13, 2017. The scope of work presented in this section consists of the following tasks:

- Task 1 – Project Management
- Task 2 – Project Meetings
- Task 3 – Data Compilation and Existing Model Review
- Task 4 – Conceptual Model Development
- Task 5 – Numerical Model Development
- Task 6 – Groundwater Model Report

Golder Associates Inc.
1430 W. Broadway Road, Suite 108
Tempe, AZ 85282 USA
Tel: (480) 966-0153 Fax: (480) 966-0193 www.golder.com

- Optional Task 7 – Training
- Task 8 - Allowance

The scope of work for each task is described in detail below.

2.1 Task 1 – Project Management

Task 1 is for overall project management and coordination, including financial management, over the anticipated three-year course of the project. Project management will be a critical, ongoing task for the duration of the project due to the complex, regional scale of the modeling effort and the interests of multiple stakeholders. Golder's approach to project management will be regular, clear communication with the Steering Committee on technical progress and concerns, and with the City of Prescott on contract and budget issues.

Project management will include the following subtasks:

- Subtask 1.1 – Communication
- Subtask 1.2 – Financial Management
- Subtask 1.3 – Technical Management

These subtasks are further discussed below.

2.1.1 Subtask 1.1 – Communication

Clear, ongoing communication among the Golder team and between Golder and the Steering Committee will be a priority throughout the project. The Project Manager (Dave Carr) will coordinate with Golder staff to ensure that the appropriate resources are assigned, and the Project Director (Mark Birch) will be responsible for providing senior level review of project deliverables and ensuring that the project is completed to the Steering Committee's satisfaction. Golder proposes that the Project Manager (Dave Carr) be the point of contact with the City of Prescott on contractual issues and that the Senior Modeler (Betsy Semmens) be the point of contact with the Steering Committee on technical issues. Golder understands that email communication is preferred and that no conversations regarding the project should be held with individual members of the Steering Committee or their specialized technical consultants.

Golder will send monthly progress reports to the Steering Committee briefly documenting the progress made during the previous month, and any issues encountered or resolved. The monthly reports will document the time period covered by the report, work accomplished, and budget expenditures, and will include an updated project schedule.

Regular meetings will be an important aspect of the project and are discussed under Task 2. Golder will record minutes of all meetings we attend and will submit them to the Steering Committee Chair.

2.1.2 Subtask 1.2 – Financial Management

The Project Manager (Dave Carr) will be responsible for managing the financial aspects of the project, including budget tracking and monthly invoicing. Golder's designated Project Controller (Emily Clark) will track the project's finances and schedule, and will communicate this information on a weekly basis to the Project Manager and the Project Director (Mark Birch). Invoices will be submitted monthly by the Project Manager in the format prescribed by the City of Prescott, and all Steering Committee members will be copied on emailed invoice submittals for their own financial records. The financial reports prepared by the Project Controller will be included with each invoice package.

2.1.3 Subtask 1.3 – Technical Management

The technical aspects of the project will be managed by Joanna Moreno (Modeling Director), Betsy Semmens (Senior Modeler), and Rochelle Destrampe (Senior Project Hydrogeologist). Given the large scale of the project, the technical aspects will be divided based on the strengths of each of these key Golder team members. Rochelle Destrampe will be responsible for managing the efforts of compiling and organizing the data as well as portions of data analysis. Betsy Semmens will be responsible for managing portions of data analysis as well as the model construction and calibration. Joanna Moreno will be responsible for managing the parameter estimation part of model calibration and sensitivity and uncertainty analyses. Betsy Semmens will be the point of contact with the Steering Committee on technical issues, and all Golder key team members will work together to ensure consensus on the project's technical approach and progress.

2.1.4 Cost Assumptions for Task 1

The cost estimate for Task 1 is based on the following assumptions:

- Ongoing internal and external Project communication will require 1 hour per week for the Project Manager for the three-year duration of the Project. The monthly progress reports will require 1 hour per month for the Project Manager and 2 hours per month for the Project Controller for the duration of the Project.
- Financial management of the Project will require 4 hours per month for the Project Manager for budget tracking and invoicing, and 6 hours per month for the Project Controller for budget tracking and schedule updates for the duration of the Project.
- Technical management of the Project will require 2 hours per month for the Senior Modeler for internal and external Project coordination for the duration of the Project.

2.2 Task 2 – Project Meetings

Regular meetings between Golder and the Steering Committee will be important to facilitate collaboration and communication among all parties. At a minimum, Golder expects that these will include a Project kick-off meeting, a site reconnaissance trip, conference calls with the Steering Committee, and multi-agency meetings, as further discussed below.

2.2.1 Subtask 2.1 - Project Kick-off Conference Call

Golder will attend a Project kick-off conference call with the Steering Committee after the contract has been executed. For scheduling purposes Golder assumes that the conference call will be held in March 2017. During the call, Golder will provide a detailed Project schedule and a list of the team members involved in the Project along with their email addresses. We anticipate that the following topics will be discussed:

- Format for project communications
- Schedule for Steering Committee and multi-agency meetings
- Schedule and method for obtaining new/in-progress data from the Steering Committee
- Schedule and method for obtaining existing data from the Steering Committee
- Data transfer protocol
- Process for sharing data analysis results (including ArcGIS and Leapfrog™ formats)
- Maximum domain for compiling and analyzing data (e.g. Big Chino Sub-basin, Hell Canyon, upper Verde River). See Figure 1 (attached).
- Database format
- Coordinate system

- Team members
- Refinement and approval of the Project schedule

Golder will record and prepare the minutes for the Project kick-off conference call. We will send the meeting minutes to the current Chair of the Modeling Committee, and will copy the other Steering Committee members and Benjamin Burns with the City of Prescott.

2.2.2 Subtask 2.2 – Site Reconnaissance

As suggested by the Steering Committee at the Pre-Scoping Submittal Meeting, Golder will participate in site reconnaissance for general orientation, and to become more familiar with site conditions and in-progress data collection locations. The site reconnaissance will consist of a 1-day aerial tour via helicopter, followed by a two-day site visit using ground transportation.

2.2.3 Subtask 2.3 – Quarterly Steering Committee Conference Calls

Golder understands that the Steering Committee meets monthly in Prescott, Arizona, and that Golder will be expected to attend these meetings via conference call, periodically and/or at key Project milestones. For scheduling and costing purposes we have assumed that we will participate in a conference call every three months over the course of the Project. We assume that at these meetings we will discuss the progress of the Project (technical issues, budget, and schedule) and any concerns that need to be addressed. We will record and prepare minutes for those meetings that we attend via conference call. We will send the meeting minutes to the current Chair of the Modeling Committee, and will copy the other Steering Committee members and Benjamin Burns with the City of Prescott.

2.2.4 Subtask 2.4 In-Person Meetings at SRP

In addition to the periodic Steering Committee conference calls, Golder anticipates the need for occasional in-person meetings as well over the course of the Project. Golder understands that there will be periodic multi-agency meetings over the course of the Project that will include members of the Steering Committee and may include representatives from the Yavapai County Flood Control District (YCFCD), United States Geological Survey (USGS), and Arizona Department of Water Resources (ADWR). Golder understands that these meetings typically are all-day meetings held at the SRP offices in Tempe, Arizona. Golder further understands that we will be asked to occasionally attend these meetings and that our role will be to present on a specific agenda topic, but that we should plan to stay at each meeting for its entirety. We will record and prepare minutes for those meetings that we attend. We will send the meeting minutes to the current Chair of the Modeling Committee, and will copy the other Steering Committee members and Benjamin Burns with the City of Prescott.

2.2.5 Subtask 2.5 In-Person End of Project Meeting at SRP

Golder will attend a meeting at the end of the Project at the SRP offices in Tempe after the final groundwater model report has been finalized. Golder will present the final report and will be prepared to discuss data compilation that has been conducted since the final technical memorandum and the potential for ongoing support to the Steering Committee. Golder will record and prepare the meeting minutes. We will send the meeting minutes to the current Chair of the Modeling Committee, and will copy the other Steering Committee members and Benjamin Burns with the City of Prescott.

2.2.6 Cost Assumptions for Task 2

The cost estimate for Task 2 is based on the following assumptions:

- The five key Golder Project team members (Mark Birch, Dave Carr, Joanna Moreno, Betsy Semmens, and Rochelle Destrampe) will participate on the Project kick-off conference call. The call will be two hours in duration.

- Site reconnaissance will require three days; one day for aerial reconnaissance via helicopter and two days by ground transportation. The five Golder key team members will participate, and aerial and ground transportation will be provided by the Steering Committee.
- Golder will attend four Steering Committee meetings per year via conference call (total of 12 conference calls) over the three-year course of the Project. Four Golder team members will participate during each conference call, and each call will be two hours in duration.
- Golder will attend two in person meetings at SRP per year over the three-year course of the Project (total of six meetings). The in-person meetings will be held at the SRP offices in Tempe, and two Golder team members will attend each meeting for six hours.
- The five key Golder Project team members will attend the final in-person meeting at the end of the Project. The meeting will be held at the SRP offices in Tempe, and will be two hours in duration.
- The cost estimate for Task 2 includes time for preparing for the meetings and conference calls, round-trip travel to in-person meetings, and preparing the meeting minutes.

2.3 Task 3 – Data Compilation and Existing Model Review

The third task is for compiling and analyzing the large volume of data available for the Big Chino Sub-basin and vicinity, and for reviewing the published modeling studies in detail. It is assumed that the initial model domain will encompass an area sufficient to evaluate the four conceptual models (CMs) provided by the Steering Committee, and that data will be compiled and analyzed for at least this initial model domain, as shown on Figure 1 (attached).

Data compilation and review will include the following subtasks:

- Subtask 3.1 – Data Compilation
- Subtask 3.2 – Data Management
- Subtask 3.3 – Data Analysis
- Subtask 3.4 – Existing Model Review
- Subtask 3.5 – Technical Memoranda

These subtasks are further discussed below.

2.3.1 Subtask 3.1 - Data Compilation

Much of the site data are available from online agency sources, such as ADWR, or from previously published reports. The Steering Committee will provide some information, such as the newly collected data from in-progress data collection activities. We will initially use the USGS Northern Arizona Regional Groundwater Flow Model (NARGFM) report's bibliography for sources of compiled data.

For costing purposes we assume that data compilation and analysis will include the entire Big Chino Sub-basin, Hell Canyon, and the western part of the Verde Valley Sub-basin. Little Chino Sub-basin will not be included.

The proposed steps to compile, store, and share the data are discussed below.

2.3.1.1 Data Transfer and Storage

An important part of this task will be to set up an efficient and transparent means to share the data, such as a data room. Golder will set up an extranet site and provide access to all members of the Steering Committee, and all data transfers will occur through the extranet site. Furthermore the data compiled by Golder will be documented on the extranet site so all parties are aware of the data used in the data analysis.

2.3.1.2 Data from the Steering Committee

We assume that the following data will be provided by the Steering Committee. For scheduling purposes we assume the data already available will be provided within the first two months of the project.

- In-progress data already available
  - Flowtography data
  - Snowtography data
  - Provisional geophysical data
  - Streamflow monitoring data
  - Groundwater monitoring data
  - Other
- Well borehole data
  - Potential unpublished data from the Big Chino Water Ranch (BCWR) project
  - ADWR imaged well records (post-code ["Wells 55"] and pre-code ["Wells 35"])
- Aquifer testing data
  - Potential unpublished data from the Big Chino Water Ranch (BCWR) project
  - Other
- Stream flow monitoring data
- Precipitation data
  - Monitoring sites maintained/sampled/managed by the Steering Committee
  - Other (not available online)
- Geochemical data
  - Data from a recent study in the upper Verde River
  - Provisional data acquired by the Steering Committee from the USGS. We understand a new data collection program will begin in Spring 2017.
  - Other
- Geophysical data
  - Provisional data (Priority 1-3 cross sections) acquired by the Steering Committee from the USGS
  - Potential unpublished data from the Big Chino Water Ranch (BCWR) project
  - USBR geophysical data (Ewing, Osterberg, and Talbot 1994)
  - USGS published geophysical data (e.g. OFR 2004-1411-C *in* Wirt 2005)
- Early crop survey data (Geographic Information Systems [GIS] datasets to the 1940s)
- Previous modeling for the BCWR Assured Water Supply (AWS) study
- CV Ranch report
- Older aerial photography
- Other reports and information available on disk from the SRP's exhibits from the AWS Office of Administrative Hearings (OAH)
- Doppler data

- Other data

2.3.1.3 Online Data and Published Reports

We will compile available data from online resources (such as ADWR databases) and review data published in previous studies of the area. Available data may include but not be limited to:

- Aerial photography and Satellite imagery
- Climatic data (precipitation, snow fall, evapotranspiration)
- Crop, vegetation, soil, and land use surveys
- Estimates of water budget components (runoff, recharge as percent precipitation and/or elevation model, or other assessment tools such as Soil and Water Assessment Tool [SWAT], Basin Characterization Model [BCM], Hydrological Simulation Program-Fortran [HSPF])
- Geology, cross sections, structures (maps, GIS layers), and depth to bedrock
- Hyporheic zone flow behavior and channel recharge
- Previous modeling analyses for the area
- BCM model
- Geochemical data
- Pumping records
- Hydraulic properties (hydraulic conductivity, storativity, and primary and secondary porosity)
- Spring flow, spring and seep inventories
- Streamflow
  - USGS gauges
  - Other
- Topography
- Water levels
  - ADWR's Groundwater Site Inventory (GWSI) database
  - USGS published data
  - Other
- Well locations and borehole geology/lithology
  - ADWR's Wells-55 database
  - Other
- USGS Aeromagnetic data
- ADWR crop surveys
- Yavapai County snow gauge stations
- USGS and Yavapai County Water Advisory Committee (YCWAC) geochemical data

2.3.2 Subtask 3.2 - Data Management

Proper management of the large volume of data to be compiled for the project will be critical to ensure that all relevant data are analyzed and considered for refinement of the site CMs. Golder proposes using the following tools to assist with data management:

2.3.2.1 Relational Database

We propose to use a relational database (Microsoft Access) to keep tabular data organized and to provide an efficient means of querying and graphing the data and linking with ArcGIS. The database will include an inventory of the data compiled and reviewed for the project. The database will be able to be queried by data type (geology, geophysics, aquifer test, etc.), well name, sub-region, etc.

The database can be made available on the extranet site for the Steering Committees and their specialized technical consultants to access and use.

2.3.2.2 ArcGIS

We propose to use ArcGIS to organize and display the spatial data and to analyze spatial relationships within and between data sets. The following steps will be involved with creating and using ArcGIS:

- Confirm the coordinate system. Golder understands that the City prefers NAVD 88 for a vertical datum and City of Prescott survey coordinates for a horizontal coordinate system.
- Build a Master file that contains at least the following data types:
  - Base maps
  - Topographic coverages
  - Well databases
  - Streamflow gauges
  - Spring flow measurements
  - Climatic stations
  - Cross section locations
  - Geologic coverages/structures
- Establish hyperlinks where possible to link to data outside of the ArcGIS. For example:
  - Hydrographs
  - Borehole/well logs
  - Photos
- Create numerical model input files.
- Evaluate numerical model calibration results.
- Share the ArcGIS information and dataset metadata with the Steering Committee.

Due to the ongoing nature of data compilation and analysis the ArcGIS will need to be maintained and updated throughout this project as additional data become available and/or additional data analysis is required. The ArcGIS will be shared with the Steering Committee and their specialized technical consultants in two ways:

- Golder can share the geodatabase on the extranet site and update it periodically throughout the project. We can also create a basic map document in which the geodatabase layers are referenced. We can also provide key data layers in Google Earth formatted files (kmz, kml) on the extranet site. Committee members and their consultants can then download these files for review and use.
- Golder can create and maintain an interactive ArcGIS map that the Steering Committee and their consultants would access through a free web-based GIS viewer.

At this time (for costing purposes) we propose that the ArcGIS data be shared with the Steering Committee by periodically sharing an updated geodatabase, a basic map document, and key data layers in Google Earth format on the extranet site, and not through an interactive ArcGIS map accessed through a free web-based GIS viewer.

2.3.2.3 Leapfrog™

We propose to use Leapfrog™ to organize the geologic information and to assist with the interpretation of geology at depth. The general steps for creating a three-dimensional geologic model are:

- Format input (collar) files of borehole data
- Georeference existing cross sections
- Digitize cross sections and faults
- Create and digitize new cross sections
- Apply 3D interpolation
- Review results and make adjustments based on data and professional judgment
- Share the Leapfrog™ model with the Steering Committee

Progress updates and the final 3D geologic model will be shared with the Steering Committee through Leapfrog™'s free viewer software, as well as with static maps and sections cut through the model. A technical memorandum will be submitted to present the results of the Leapfrog™ geologic interpretation, prior to starting the numerical model construction.

2.3.3 Subtask 3.3 - Data Analysis

The data gathered for the project will be analyzed to help refine the CMs of the area and to provide defensible input datasets for the numerical model. The data will be considered for spatial and temporal trends and correlations, and quality.

2.3.3.1 Time Series Analysis

Time series graphs provide a means to identify data trends over time and correlations between datasets such as groundwater level changes and major precipitation events or pumping periods. Time series plots will be created for at least the following datasets:

- Water levels
- Streamflow
- Spring flow
- Pumping
- Precipitation
- Water quality. Parameters preliminarily selected are listed below.
  - TDS
  - Temperature
  - Arsenic
  - Sodium or Boron
  - C-14
  - Stable isotopes

The rationale for the selection of these parameters is detailed in Table 1 below.

Table 1: Water Quality Parameters Preliminarily Selected for Evaluation

Analyte	Purpose of Spatial or Temporal Analysis	Potential Use in Modeling
Specific Conductance or TDS	Assess proportion of runoff in recharge	Inform recharge distribution, clue to relative importance of short-term storm events
temperature	Groundwater travel path (deep/shallow)	Identify cross basin flows
pH	Essential for any geochemical interpretations. We are not proposing to conduct geochemical modeling or interpretation, but others might want to do so.	Geochemical interpretations could be used to identify sources, rock-water interaction, and what would be expected from mixing
As	Assist with ID source aquifer(s) and potentially with ID upwelling	Compare to simulated vertical hydraulic gradients
Na or B	Identify source aquifer(s) - Widest range of observed concentrations	Compare to simulated flow balance
C-14	Groundwater age	Compare to simulated flow paths and travel times
stable isotopes	Groundwater age, elevation of recharge, summer versus winter precipitation	Inform recharge distribution

2.3.3.2 Spatial Analysis

Spatial analysis will be done for the datasets to determine spatial trends, such as groundwater contours to determine hydraulic gradients, correlations in hydraulic properties between aquifer test locations, and spatial trends in geochemical data. We will spatially analyze and create maps using ArcGIS, Surfer® (data interpolation tool), or Leapfrog™ for at least the following datasets:

- Aquifer tests
- Water levels
- Water quality
- Isotope data and geochemical data
- Geophysical surveys
- Depth to bedrock
- Lithology
- Structural features

New cross sections will be created, as needed.

2.3.3.3 Data Quality

Data will be assessed during the process of data assembly and poor or inconsistent data will be noted and key discrepancies will be discussed with the Steering Committee. Data quality considerations may include: (1) qualifying descriptions in source material, (2) inconsistent data points identified in the spatial and temporal data analysis, (3) cautions relating to using data from different populations, (4) fall within reasonable/physically possible ranges, and (5) can be scaled up for use in numerical model. The data qualifiers will be included in the database and clearly invalid data will not be used in model development.

For costing purposes it is assumed that no re-analysis of data (for example, aquifer pumping test results and isotope interpretations) will be required, and where multiple interpretations exist the latest data interpretation can be used.

The data analysis will be communicated with the Steering Committee through technical memoranda submitted as part of Subtask 3.5.

2.3.4 Subtask 3.4 - Existing Model Review

Multiple numerical models have been created for the Big Chino Sub-basin/UVS area. Golder will review these models, and where appropriate will use them, or their data sources, to provide additional interpretation and information to refine the CMs, and to provide boundary conditions for the numerical model. The models to be reviewed include:

- NARGFM
- Prescott AMA/LIC models
- Leonard Rice Big Chino model (limited to web material only)
- SW Groundwater Big Chino model
- SW Groundwater Flagstaff model (as pertains to use of BCM model)
- USBOR (1994) model (report only)
- SW US BCM model (Flint and Flint 2007)

2.3.5 Subtask 3.5 - Technical Memoranda

Golder will prepare a series of technical memoranda to summarize the results of Task 3 including any interpretations and identified data gaps. We anticipate that data compilation will be ongoing throughout the project; therefore, we propose submitting three technical memoranda throughout the life of the Project. The technical memoranda will be presented to the Steering Committee for review and comment.

For costing purposes Golder proposes the Task 3 technical memoranda contain the following information:

- The first technical memorandum will be submitted 4 months after the Project begins, and will summarize the data compiled to date. The purpose of this submittal will be to receive feedback from the Steering Committee on the data sources used for the project.
- The second technical memorandum will be submitted to document the Leapfrog™ 3D geologic model, approximately 2 to 4 months after the initial technical memorandum. The purpose of this submittal will be to receive feedback from the Steering Committee on the interpretation of the geology prior to significant construction of the numerical model.
- Data compilation and analysis conducted during numerical model development will be summarized in technical memoranda for Tasks 4 and 5, as appropriate for the topic of the memorandum, or during conference calls over the duration of the Project.
- The third technical memorandum will be submitted approximately 2 months prior to the end of the Project, and will include a summary of the data compilation and analysis effort since submittal of the draft modeling report.

2.3.6 Cost Assumptions for Task 3

The cost estimate for Task 3 is based on the following assumptions:

- The domain for data compilation and analysis will include the entire Big Chino Sub-basin, Hell Canyon, and the area of the UVS, as shown on Figure 1 (attached).

- The Little Chino Sub-basin will not be included in the data compilation and analysis, except to review published estimates of groundwater inflow to the UVS area. It is assumed that the existing model data will be adequate for this purpose.
- Data analysis performed after the second half of the model calibration period may not be included in the numerical model calibration or in the modeling report (draft or final). Data analysis that is not included in the numerical model or reports will be documented in the third technical memorandum of Task 3.
- Golder will cease analysis of in-progress data in mid-February 2020 to allow time for the third technical memorandum of Task 3 to be written and submitted to the Steering Committee for review.
- Data compilation activities performed after the submittal of the third technical memorandum for Task 3 will not be documented in a report or technical memorandum, but can be discussed at the End of Project meeting.
- No re-analysis of data (for example, aquifer pumping test results and isotope interpretations) will be required, and where multiple interpretations exist the latest data interpretation can be used.
- Golder will share ArcGIS information through periodic updated geodatabases on the extranet site and Google Earth data layers, and not through an interactive web-based map.
- The format for the relational database will be Microsoft Access.
- Golder will create six new cross sections.

2.4 Task 4 – Conceptual Model Development

A CM is a simplified, high-level representation of the site that describes the origin and interaction of groundwater at land surface and its movement through the subsurface. The numerical model will be constructed to conform to each viable CM, therefore, it is advantageous to refine each of the CMs prior to dedicating the effort to developing the numerical model. The development and/or refinement of the CMs of groundwater flow and discharge to the UVS is a critical component of the Project because the CMs will form the basis for development of the numerical model. The CMs need to be defensible, clearly defined, and follow from the analysis of the available data for the Big Chino Sub-basin and UVS area.

2.4.1 Subtask 4.1 – Review/Alterations of Existing Conceptual Models

CMs of the area have been developed by different working groups over time, but the analysis supporting each CM may not be consistent, due to differing degrees of data available, areas of study, or the purpose of each project, etc. These differences may have introduced biases in the interpretation of the data supporting the development of the CM. Additionally, in-progress data collection in the Big Chino Sub-Basin may provide new information that clarifies components of the CMs. Therefore, we propose that the project team take a fresh look at the relevant data and make recommendations on the validity of the existing CMs, any modifications to the existing CMs, and any proposed new CMs.

Four CMs have been proposed by the Steering Committee. These CMs differ in their assumptions about the source water for the UVS, i.e., source water in differing proportions from the basin-fill, volcanic, and carbonate aquifers in the Big Chino Sub-basin, and from the carbonate aquifer to the north of UVS (see Figure 2 below). Focused recharge in streams, streambeds, and via faults may provide a significant contribution to the water budget. In addition, inter-basin flows may need to be considered. Each of these CMs will be considered, along with other viable conceptual models, and where appropriate, refined or discarded based on what is learned during the data analysis portion of the project (Task 3). Part of the CM development is to identify both known and unknown or uncertain elements of the water budget.

The proposed steps in CM development and refinement are to use the databases developed in Task 3 to:

- Characterize the surficial processes of the hydrogeologic system (e.g. groundwater-surface water interactions, recharge, evapotranspiration, etc.).
- Characterize the subsurface geologic framework (including thickness and continuity of lithologic units, structural discontinuities, and conclusions from geophysical characterizations).
- Characterize the hydrogeologic framework (including saturated thickness and aquifer or confining nature of primary hydrostratigraphic units). The southern end of the Big Chino Sub-basin, which exhibits a flat groundwater gradient and observed voids, will need to be addressed as an area with potentially fracture-controlled flow. Dual porosity, CLN factures, or upscaled hydraulic properties will be considered in CM development.
- Characterize the groundwater system (including time varying recharge consistent with seasonal and short term precipitation, clues offered by water quality and isotope data, boundary conditions, etc.).
- Describe and visualize the groundwater system CMs using cross sections, three-dimensional, and plan view illustrations.

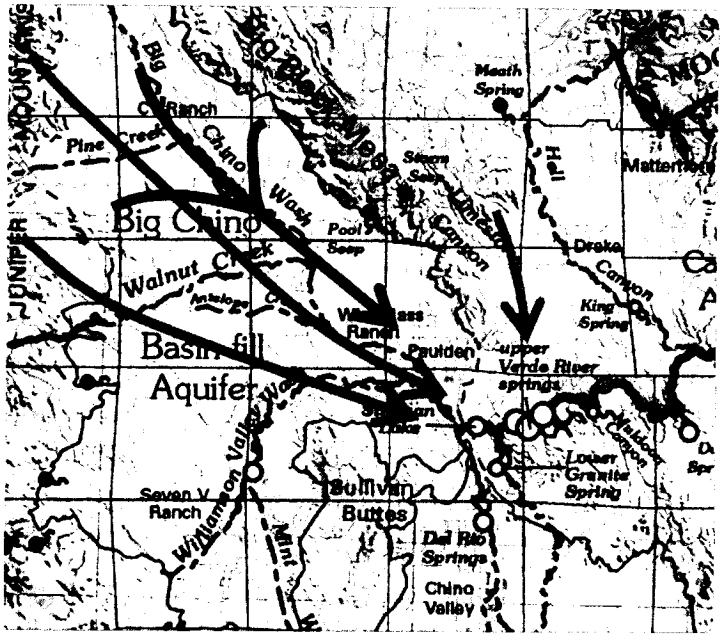

Figure 2: Alternate Conceptual Models Proposed by the Steering Committee

2.4.2 Subtask 4.2 – Develop New Conceptual Models

New CMs may be developed if the review and analysis of the data suggest interpretations other than those currently encompassed by the existing CMs. Subtask 4.2 refers to the development of potential CMs prior to the development of the numerical models, based on the compilation, management, and analysis of site data (Task 3). Subtask 5.4 (below) refers to revisions to, or potential new development of, CMs during model development and calibration. Any new CMs developed in Subtask 4.2 will be presented to the Steering Committee for review and discussion.

2.4.3 Subtask 4.3 – Initial Water Budget

An initial surface water and groundwater budget will be developed, for each viable CM, for the model area based on the information gathered during Task 3. Both long-term water budgets and seasonal budgets will be considered. It is understood that the water budgets will be incomplete and contain assumptions; however

it is an element of developing the overall understanding of the flow system. The purpose of the initial water budget will be to provide initial input to the numerical model. Key water budget items will include:

- Mountain block recharge
- Recharge from runoff
- Pumping, evapotranspiration, and spring discharges
- Changes in storage over time
- River and riverbed flows
- Inter-basin flows

The water budget will be refined during model calibration, and differences between the numerical model's water budget and the initial water budget will be discussed with the Steering Committee.

2.4.4 Subtask 4.4 – Assessing Multiple Conceptual Models

If multiple viable CMs remain after evaluation, these variations on the basic model framework will be developed into numerical models so that their ability to explain observed flow and water level data can be tested. At this point some of the CMs may be removed on the basis of poor calibration. The process of calibration may result in multiple combinations of reasonable model parameters that calibrate the model equally well, either within one CM and/or between alternate CMs (Beven 2002, Refsgaard et al. 2004). In other words, more than one CM may provide reasonable solutions. It is expected that isotope and other data collected in the future will assist in eliminating one or more CMs. Prior to these data being available, viable models will be retained for further analysis in a numerical model.

2.4.5 Subtask 4.5 –Technical Memorandum for Conceptual Models

Golder will prepare a technical memorandum to summarize the results of Task 4 including any revisions to or discards of the existing conceptual models, any newly developed conceptual models, and the initial water budget. Special emphasis will be made to document how revisions, discards, or new interpretations are supported by the data as well as to report any additionally identified data gaps. The CM summaries will include:

- Brief description of area conditions including photographs, key geologic sections, groundwater flow directions and magnitudes, key sources and sinks, key cross boundary and internal boundary flows
- Characterization and evaluation of uncertainty and data gaps in the CMs
- Review of assumptions
- Summary tables for surface water and groundwater flows
- Summary figures (such as the example shown in Figure 3 below)

A key component of the technical memorandum for Task 4 will be the recommendation of CMs to carry through to numerical model development. This will also be a key discussion point and milestone for a meeting with the Steering Committee. The technical memorandum will be presented to the Steering Committee for review and comment.

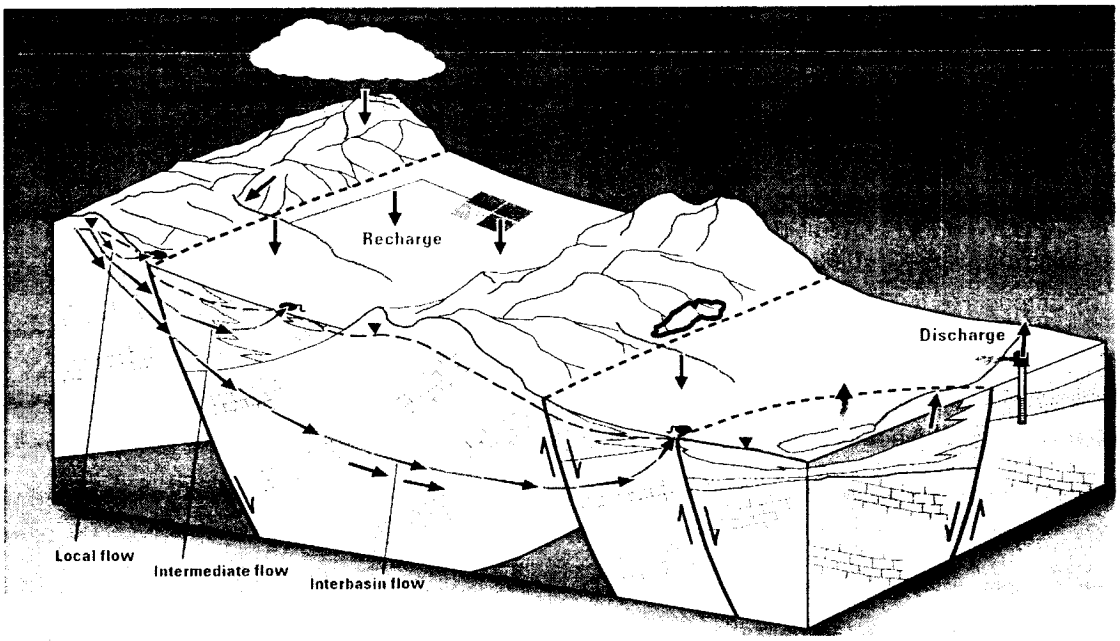

Figure 3: Example Conceptual Model

2.4.6 *Cost Assumptions for Task 4*

The cost estimate for Task 4 is based on the following assumptions:

- Four CMs will be evaluated and two will be developed as numerical models.
- A meeting or conference call will be held with the Steering Committee at or near the end of Task 4 to discuss Golder's recommendations of the CMs to be carried through to numerical model development.
- The Little Chino Sub basin will not be included in the conceptual model analysis.
- Previous conceptual models of the Little Chino Sub basin will not be reinterpreted and will be used to define groundwater contributions to the numerical model domain from this area.

2.5 Task 5 – Numerical Model Development

The fifth task is to create and calibrate the numerical model(s). The CMs developed during Task 4 will be used as the basis for the development of the numerical model(s). The process of model development involves first creating the framework of the numerical model to represent the CMs, then calibrating the model to historical and recent data. This is an iterative process because calibration usually highlights data gaps, errors in the conceptual models, or areas of the numerical model that need more refinement. Subsequently, adjustments need to be made to either the conceptual model, the numerical model construction, or both. The proposed steps for developing the numerical model are presented below.

2.5.1 *Subtask 5.1 – Model Selection*

Selecting the most appropriate software to model the groundwater system in the Big Chino Sub-basin is an important step in the process of developing the numerical model. The software needs to be well tested, well known and accepted, and have the capability to represent the aquifer geometry, hydrostratigraphy, important geologic structures, and groundwater sources and sinks, and those features with which it interacts.

There are currently five general approaches to groundwater modeling at a regional or basin-scale to simulate the water balance and the impacts of pumping. These are listed below in order of least to most complexity:

- Analytical-solution models and analytic-element models (e.g., water balances incorporating Dupuit or similar assumptions, WHAEM, etc.)
- Continuum numerical-solution models (e.g., MODFLOW, FEFLOW, HydroGeoSphere)
- Continuum numerical-solution models using discrete fracture network (DFN) information (e.g., MODFLOW or FEFLOW using DFN data upscaled through an interface such as MAFIC which maps hydraulic properties from a fracture model onto finite difference or finite element grids)
- DFN models (e.g. FRACMAN)
- Multiphase and variable density flow models for highly saline aquifers or carbon sequestration (e.g. TOUGH2)

Other options that can be added to most of these approaches are:

- Parameter estimation to speed calibration
- Automated sensitivity testing
- Uncertainty analysis
- Geologic modeling and visualization
- Flow source/depletion modeling

In general, the most cost-effective approach is the least complex approach that matches the level of data available and the goals of the project. For example, if both geotechnical analyses and groundwater management are required, structural data on orientation, intensity and length scale of fractures are available, and flow from individual structures is important, then a DFN model is warranted. If groundwater data are sparse and conservative simplifying assumptions do not lead to expensive mitigation measures, then analytical or analytic-element solutions are warranted. From our understanding, this project falls between these categories, leaving the options of MODFLOW, FEFLOW, MODFLOW-USG, and HydroGeoSphere. Differentiators between these options are summarized in Table 2 below.

Table 2 – Model Comparison

Model → / Differentiator ↓	MODFLOW	MODFLOW-USG	FEFLOW	HydroGeoSphere
Groundwater-surface water interaction	yes	yes	yes	yes
Lake package	yes	yes[a]	somewhat[a]	yes
Vadose zone	no	not in first release	yes	
Pumping optimization	yes[b]	no	no	no
Complex layering and discontinuities	no	yes	yes	yes
Localized fine discretization and large aspect ratios	no	yes	yes	yes
Flow in discrete features	yes	yes	yes	yes
Associated transport code	yes	yes	yes	yes

Table 2 – Model Comparison (continued)

Model → / Differentiator ↓	MODFLOW	MODFLOW-USG	FEFLOW	HydroGeoSphere
FlowSource/depletion modeling	yes[c]	yes[a]	somewhat	Somewhat
Familiar to regulators and likely future users	yes	yes	somewhat	no
Public domain and transparent	yes	yes	no	no

Notes:
[a] = Under development. FlowSource (and particle tracking) is available for MODFLOW-USG, but not currently for pinched out or nested layers. Quadtree refinement is however supported.
[b] = Using MODMAN or similar
[c] = Using FlowSource

Golder has licenses and users for all of these codes, however, the number of highly experienced users decreases with model complexity. For the Big Chino Sub-basin project, the italicized features in shaded cells are likely to predominate and therefore either MODFLOW or MODFLOW-USG will be the most cost effective and useable model framework. The final model selection will be based on consultation with the Steering Committee (see Subtask 5.3).

2.5.2 *Subtask 5.2 – Model Construction*

The numerical model will be constructed to represent the CMs that are carried forward to numerical model development in Task 4. Although other numerical model codes will be considered, we anticipate that the numerical groundwater model will be developed using the MODFLOW software code with Groundwater Vistas as the graphical user interface. The MODFLOW code is a widely known and well-accepted industry standard for representing groundwater systems in hydraulic continuity with surface water systems. Based on the data reviewed for this proposal, it is expected that the following MODFLOW packages may be used:

- Stream-flow routing package for detailed groundwater/surface water interactions
- Gauge package for the stream gauges
- Drain package for wetland and spring areas
- Evapotranspiration package for wetland and spring areas
- The lake package may be used if Stillman Lake stage data are available
- The multi-node well package if wells are screened across more than one aquifer unit
- The connected linear network package (if using MODFLOW-USG)

The proposed steps for constructing a numerical groundwater flow model for the Big Chino Sub-basin are as follows:

- Define the overall model domain. Based on our current understanding, the model domain will encompass the Big Chino sub-basin, the area of the UVS, and the Hell Canyon watershed.
- Determine the model grid and layering. A horizontal model grid will be proposed to the Steering Committee that provides greater resolution (finer grid) near features of interest (streams, spring, fractures and faults, and primary groundwater withdrawals) to help ensure adequate resolution. A layering structure will be proposed to the Steering Committee to divide the depth of the model vertically into multiple layers based on the geologic and/or hydrostratigraphic units and geometry delineated during data analysis (Task 3). Ideally, the layering and grid refinement proposed will accommodate all of the proposed CMs. Leapfrog™ will be used to assist transferring the subsurface, interpreted geology to the numerical model grid.

- Determine the base of the numerical model. Based on the review and analysis of data in Task 3, an overall depth and bottom to the numerical model will be proposed to the Steering Committee that provides adequate vertical coverage and a definable base to the flow system.
- Initially define external boundaries to the numerical model. The external boundaries of the model domain must be defined to describe how groundwater within the model domain interacts (if at all) with groundwater outside the domain. Proposed external boundaries will be presented to the Steering Committee based on the review and analysis of data in Task 3 and the development of the initial water budget in Task 4.
- Initially define sources and sinks to the numerical model. Additions of water to, and subtractions of water from, the model domain must be defined, at least for those water budget components deemed significant enough to include in the model simulation. Sources and sinks can be features that simply add or remove groundwater, such as a drain to simulate the loss of groundwater at a spring, or recharge of precipitation to groundwater, or they can be features that interact with groundwater for which the interaction is deemed important to explicitly simulate in the model, such as flow in a stream, evapotranspiration at springs, riparian areas, or shallow water table areas, or pumping from a well. The proposed representation of those sources and sinks identified in the initial water budget of Task 4 will be presented to the Steering Committee for discussion.
    - The characterization of recharge to groundwater will be an important component of defining sources and sinks. A method will be proposed to estimate and distribute recharge within the model domain. This will mark a key discussion point with the Steering Committee, likely requiring an in-person discussion. The proposed method may include using the BCM and/or may include recalibrating or refining the BCM to adjust for the coarse spatial grid and monthly recharge distributions. BCM model inputs and outputs will be reviewed, justified, and discussed with the Steering Committee before incorporation into the model.
- Initially define aquifer properties in the numerical model. Aquifer properties of hydraulic conductivity and storage will be initially defined for the model domain based on available data (Task 3) and supplemented by literature values.

2.5.3 Subtask 5.3 – Technical Memoranda for Numerical Model Development

Golder proposes to prepare two technical memoranda regarding the development of the numerical model.

- The first technical memorandum will present to the Steering Committee our suggested detailed approach for numerical model development. The purpose of this first technical memorandum will be to obtain comments from the Steering Committee on our suggested approach to translate the conceptual models to a numerical model framework, before proceeding with the effort. This technical memorandum will include our suggested approach to the following:
    - model code selection
    - model domain
    - model layering
    - model grid
    - boundary conditions
    - Initial hydraulic property distributions
    - initial water budget
    - representation of the sources and sinks in the model
- The second technical memorandum will document the execution of model construction including graphs, figures, and tables as appropriate, for the purpose of obtaining comments

from the Steering Committee before proceeding with model calibration as well as to report any additionally identified data gaps.

The technical memoranda will be presented to the Steering Committee for review and comment. Additionally, the components of model construction proposed under Task 5.2 will be a key discussion point and milestone for a meeting with the Steering Committee.

2.5.4 Subtask 5.4 – Numerical Model Calibration

Once the numerical models are constructed they will be calibrated to match historical and recent data. The general steps for model calibration are as follows:

- Develop a calibration approach
- Parameter estimation
- Incorporate various conceptual models
- Sensitivity analysis on the model calibration
- Evaluation of modeled groundwater flow paths
- Uncertainty analysis

These steps are detailed below.

2.5.4.1 Calibration Approach

The proposed overall calibration approach is as follows:

- Establish realistic data ranges for uncertain model input data. The input data to the model (hydraulic conductivity, storage, recharge, streambed parameters, spring (drain) conductances, etc.) is never known with complete certainty. Reasonable ranges of values will be selected for the input parameters based on the measured data and supplemented by literature values.
- Establish how hydraulic properties will be input to the model. A mixture of zones and pilot points will be used as follows:
  - Zones containing single pilot points will be used for well-defined and likely homogeneous units or poorly-defined low-flow units
  - Zones containing multiple pilot points will be used where important heterogeneity (that cannot be defined based on data) can be inferred e.g. units encompassing structure-controlled springs
  - Boundaries between adjacent zones containing multiple pilot points will be abrupt or gradual according to lithologic understanding
- Define calibration periods. While the overall model calibration will cover a specified period of time, stress periods will be defined to divide the timeframe into time periods corresponding to changes in recharge, water management, pump tests, or climatic fluctuations. It is anticipated that the proposed overall time frame will include a time period to simulate steady-state conditions, representing pre- or early-development of the sub-basin, and a time period to simulate the transient water level fluctuations from groundwater withdrawals from the sub-basin.
- Identify data to be used as calibration targets. Calibration targets are measurements or observations that model calibration strives to replicate to a reasonable degree. These data are expected to include:
  - Water levels and horizontal and vertical hydraulic gradients

- Stream flow data and spring flow data
- Groundwater age and groundwater type/mixing ratios
- Aquifer pumping test data if sufficient volume of the aquifer is stressed
- Non-numeric calibration targets, such as reports of periodic flooding in wetlands, perennial behavior of upper reaches of streams, and any other information that can be used to constrain the model

■ Determine calibration criteria. The criteria to determine if the calibration is adequate for the purpose of the project will be developed and agreed in discussions with the Steering Committee. The following considerations will apply:

- The required precision for model predictions
- The ability of measured data to constrain model predictions
- The observed variability or measurement accuracy versus the expected calibration residuals (difference between measured and modeled values)
- Methods for illustrating the calibration

2.5.4.2 Parameter Estimation (Model Calibration)

The parameters of the model that best represent the system will be determined through model calibration runs. The model will be run and the results compared to the calibration targets. From there, input parameters will be adjusted within realistic ranges and the model will be run again. This calibration and parameter estimation process continues until an adequate match is made by the model to the calibration targets. Calibration of the model will be conducted using manual calibration (trial-and-error) first and will most likely include automated calibration (e.g. using Parameter Estimation [PEST] software (Doherty 2016) as a refinement step. This latter step will involve varying suites of model input parameters in tandem until the residuals are acceptably small. Specifically, PEST can be used to automate calibration of the model (with typically better model-to- measurement fits and smaller predictive errors than possible using traditional calibration techniques), quantify sensitivity and uncertainty, and identify data gaps. Transparent and defensible uncertainty analyses are possible using this approach. This approach will include:

■ Assign weights to observation targets based on value of data in constraining prediction of interest, precision of data, numerical values of targets, and statistical distribution of observations

■ Remove insensitive parameters[1]

■ Combine correlated parameters[2]

■ Re-assess removed or correlated parameters when the model is almost calibrated

2.5.4.3 Incorporate Various Conceptual Models

As discussed under Subtask 4.4, multiple, viable CMs may remain after data analysis and CM evaluation. These variations on the basic model framework will be developed into numerical models to be tested. CMs that cannot be discarded through data analysis may be discarded during model calibration because they do not calibrate well, such as not replicating measured flows or groundwater gradients well or requiring

[1] Parameters that are more than 100 times less sensitive than the most sensitive parameter will be maintained at the initial value (based on data, literature etc.) since varying these parameters will not be productive to the calibration.

[2] Correlated parameters will be identified via correlation coefficients (with values near -1 or 1). This will indicate parameter pairs that are difficult to estimate individually. If a parameter is correlated and insensitive it will be maintained at its initial value. If a parameter is correlated and sensitive then a data gap or model uncertainty has been identified.

unrealistic parameter values (hydraulic conductivity, recharge, etc.) to do so. Assuming that more than one CM is evaluated in a numerical model the following approach is proposed:

- Incorporate viable CMs into the numerical model framework and conduct calibration runs.
- Remove CMs that do not satisfy calibration criteria. This decision will be reviewed and agreed with the Steering Committee.
- If more than one CM remains the range of results will be presented. Potentially, multi-model analyses will be applied:
  - Information criteria-based techniques (Poeter and Anderson 2005)
  - Multi-model averaging (Ye et al. 2010)
  - Multi-objective optimization (Yapo et al. 1998)
  - Multi-objective clustering (Handl and Knowles 2005)
  - Generalized Likelihood Uncertainty Estimation (GLUE) (Beven and Freer 2001)
  - Multi-Model Assessment Tool (Poeter and Hill 2007)

The goal of using a numerical tool or established approach to rank alternate CMs is to arrive at a final, unbiased model via a defensible method. All of these approaches have similar goals but differ in applicability based on the model characteristics and data available. The approach best suited to the project will be recommended and presented to the Steering Committee.

2.5.4.4 Sensitivity Analyses

Two sensitivity analysis approaches are proposed for each of the viable CMs: (1) Automated parameter estimation (PEST) for model parameters, boundary conditions, and assumptions that were varied during model calibration, and (2) Standard sensitivity analysis for special cases.

- Automated parameter estimation will also be used for sensitivity analyses if practical (i.e. if model run times permit). This approach allows for the assessment of the sensitivity of all of the parameters and assumptions based on calibrated models. This approach will allow the input parameters to be ranked and key data gaps identified.
- Standard sensitivity analysis will be used in which input parameters are individually varied over a reasonable range and the model calibration rerun. The resulting changes in model calibration will be manually assessed through graphs, tables, and figures. This approach will be used for input parameters that cannot be analyzed by the automated approach, such as those that are not sensitive to currently available data but may become sensitive to future data or under increased drawdown.

One of the purposes of the sensitivity analysis is to assess whether there are parameters that, when varied, change the model conclusions but do not change the model calibration significantly. A parameter with this characteristic will be identified as requiring additional characterization.

2.5.4.5 Evaluation of Modeled Groundwater Flow Paths

The origin of discharges at the UVS will be evaluated volumetrically, for each of the viable CMs, using particle tracking and/or FlowSource analysis (Black and Foley 2015) to confirm modeled groundwater flow paths. We propose to use FlowSource, which uses MODFLOW output flow files, to answer the questions:

- How does simulated groundwater flow to the UVS?
- How long do flow paths take to arrive at the UVS?
- What is the origin of UVS water?

- What areas or units has groundwater traveled through before arriving at the UVS?

An example FlowSource output is provided in Figure 4. This information can then be audited by comparison with isotope data in the future.

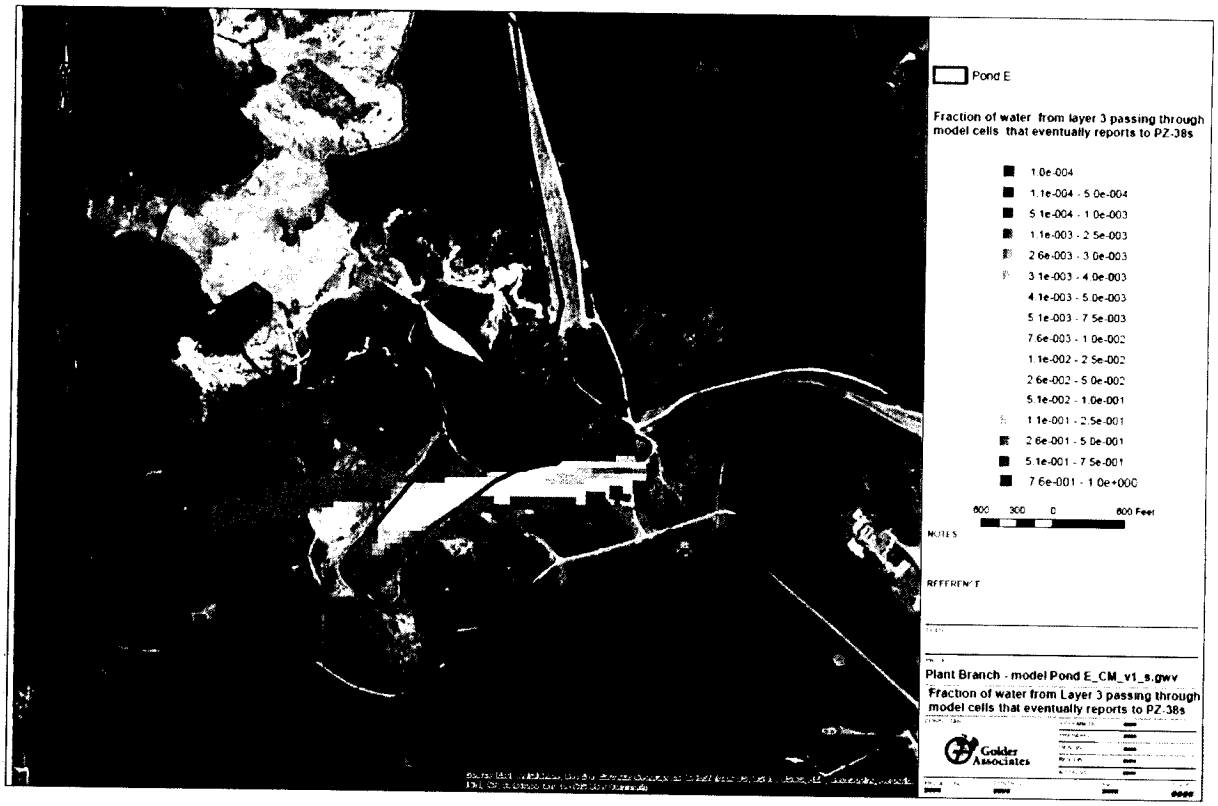

Figure 4: Example FlowSource Output Showing Fractional Contributions to Flow into a Pond

2.5.4.6 Uncertainty Analysis

Even a well calibrated model will have uncertainty in its predictions. Data gaps and uncharacterized heterogeneities are two common causes of predictive uncertainty, even though the model may reproduce the measured data (calibration targets) well. This is because input parameters can often be adjusted in multiple ways to calibrate the model and while the resulting model calibration is similar, the model prediction may be quite different. As noted in the PEST homepage: "Predictions that are especially prone to error are those that are highly sensitive to system detail. These include the interaction between ground and surface waters, and the response of an environmental system to extreme climatic events."

Ideally the model's predictive uncertainty would be assessed during this phase of the project to avoid getting too far into the project before identifying key data gaps. For example the predicted contributions of individual hydrostratigraphic or geologic units, or groups of units, to the predictions of future flow of the UVS may highlight a data gap. Predictive calculations are not part of this contract, therefore Optional Subtask 5.7 was added to this proposal to address predictive uncertainty analysis. However, in Subtask 5.4 the uncertainty of model-calculated flows to the UVS through the present will be derived and used to both rank the importance of uncertain parameters, and to evaluate the worth of existing or new data in reducing predictive uncertainty.

There are several options for conducting the uncertainty analysis which will be considered. These options are listed in order from simplest to more complex/quantitative:

1. "Predictive calibration" i.e. include a model calculation of interest as a hypothetical observation used in parameter estimation/model calibration and test whether the model calibration is successful. For example, a range of assumed fluxes to UVS originating in Big Chino valley can be tested as hypothetical observations.
2. Apply PEST in "predictive analysis" mode to maximize or minimize model-calculated historical flows to UVS originating from Big Chino valley while maintaining the model in a calibrated state.
3. Calibration-constrained Monte Carlo runs to develop uncertainty and error bounds.

2.5.5 Optional Subtask 5.5 – Refinement of CMs and Adjustment of Calibration

The exercise of developing and calibrating a numerical model typically provides insight to the groundwater flow system, which can result in a modification or refinement of the CM. The model development process outlined in this proposal appears linear (develop a CM, build a numerical model, calibrate the model, conduct sensitivity analyses) but in reality the process is iterative. Any insight gained from model development that leads to a significant modification to the CMs will be discussed with the Steering Committee. Revised CMs would then need to be incorporated into the numerical model structure and recalibrated. Although the need for this subtask is anticipated by Golder, it is presented as an optional subtask due to budget limitations. For costing purposes we have assumed that one iteration of significant CM refinement and recalibration will be required in this optional subtask.

2.5.6 Subtask 5.6 Technical Memoranda for Model Calibration

Golder proposes to prepare two technical memoranda regarding the calibration of the numerical model.

2.5.6.1 Subtask 5.6.1 – Technical Memorandum for Model Calibration Approach

The first technical memorandum will present to the Steering Committee our suggested detailed approach for numerical model calibration. The purpose of the memorandum will be to obtain comments from the Steering Committee on our suggested approach before proceeding with the effort.

2.5.6.2 Subtask 5.6.2 – Technical Memorandum for Model Calibration Results

The second technical memorandum will document the model calibration, incorporation of multiple conceptual models, sensitivity analyses, and evaluation of flow paths. The memorandum will include graphs, figures, and tables as appropriate, for the purpose of obtaining comments from the Steering Committee, as well as to report any recommendations for data collection to reduce uncertainty and for model scenarios to address uncertainty. Further refinement and calibration of the numerical model under Optional Subtask 5.5 will be documented in the final modeling report, and not in a separate technical memorandum.

The technical memoranda will be presented to the Steering Committee for review and comment. Additionally the approach to model calibration proposed under Task 5.4 will be a key discussion point and milestone for a meeting with the Steering Committee.

2.5.7 Optional Subtask 5.7 – Stress Tests

Golder understands that this scope of work should include only those activities that produce a calibrated, numerical model, and will not include future prediction model runs. Model runs that stress the model (such as increased pumpage or decreased precipitation) often provide information about data gaps and uncertainty that were not noticed during model calibration. For example, when a hypothetical model is run (e.g. pumping from a particular hydrostratigraphic unit), a calibrated model parameter that the model calibration was not sensitive to (e.g. hydraulic conductivity of an upgradient hydrostratigraphic unit in between the recharge area and the pumping well) may have a significant impact on the model's prediction (e.g. if the unit is more permeable, more of the recharge will flow through the unit toward the well, thereby

resulting in less drawdown). At this point it may become clear that this is a data gap. Knowledge of some data gaps or alternative conceptual models may not be understood until quite late in the project if no model stress runs are performed during this project.

Golder has identified two areas of model predictions that may be useful to test as model stresses. These two hypothetical stress model runs are included in the cost estimate as Optional Subtasks 5.7.1 and 5.7.2, and are described below.

2.5.7.1 Optional Subtask 5.7.1 - Groundwater pumping from the Big Chino Sub-basin

Golder proposes conducting one future predictive model run of hypothetical groundwater withdrawals from the Big Chino Sub-basin to evaluate how the model responds and to determine if any data gaps exist that, if filled, would improve the model's ability to predict responses from pumping.

2.5.7.2 Optional Subtask 5.7.2 – Precipitation Variability

Golder proposes incorporating precipitation variability into the sensitivity analysis to assess potential effects of future changes in recharge based on forecast changes in precipitation and temperature patterns. The purpose of testing such future changes is to increase resilience in the modeled solutions. Although multiple alternative future precipitation models exist, there is general agreement on some of the key expected changes in the Colorado River watershed (National Academies Press 2016). Using existing studies as a guide (Flint et al. 2015), an approach to incorporating precipitation variability indices and projected recharge changes will be discussed with the Steering Committee, then included in the sensitivity analysis.

2.5.7.3 Optional Subtask 5.7.3 – Technical Memorandum for Stress Tests

If performed, the limited stress test model runs described above will be documented in a technical memorandum and provided to the Steering Committee for review. This technical memorandum is included in the cost estimate as Optional Subtask 5.7.3.

2.5.8 Cost Assumptions for Task 5

The cost estimate for Task 5 is based on the following assumptions:

- MODFLOW will be used as the modeling platform
- Two CMs will be tested in the numerical model
- One significant revision to the CMs with recalibration of the numerical model will be required if optional subtask 5.5 is authorized. If optional subtask 5.5 is not authorized it is assumed that no revisions to the CMs or recalibration will be conducted as part of this Project.
- Two technical memoranda regarding model calibration will be prepared: one that documents the proposed model calibration approach and one that documents the model calibration.
- A stress test that simulates hypothetical pumping is included in the cost estimate as Optional Subtask 5.7.1.
- A stress test that addresses simulated precipitation variability is included in the cost estimate as Optional Subtask 5.7.2.
- If Optional Subtask 5.7 is authorized, the results will be documented in a technical memorandum, and this is included in the cost estimate as Optional Subtask 5.7.3.
- Calibration of the Little Chino Sub-basin is not included in the cost estimate previous numerical models of the Little Chino Sub basin will be used as the basis of the numerical model of this area.
- At the direction of the Steering Committee, the Little Chino Sub-basin will not be included in the model domain and calibration.

2.6 Task 6 – Groundwater Model Report

Task 6 is for preparation of a comprehensive, high quality technical report that documents the analysis and results of the Project. The report will include well-written text that is logically presented and reviewed by a technical writer, and professionally-produced tables, figures, and plates. An Acrobat Adobe PDF document will be internally bookmarked and will include hyperlinks.

The report will contain documentation of analytical methodologies and processes, references to data used, and clear explanation of the results. Results will be presented in the appropriate context, with qualifications and limitations of data sources, analytical methods, and/or results, as appropriate.

Data used in the analysis will be provided in electronic format (e.g., GIS shape files, spreadsheets, databases), or referenced to their sources. The report will be submitted in draft to the Steering Committee and finalized after incorporating the Steering Committee's comments.

2.6.1 Cost Assumptions for Task 6

The cost estimate for Task 6 is based on the following assumptions:

- One draft report will be submitted for review by the Steering Committee, and all comments will be incorporated into the final report.
- No additional draft reports will be submitted.
- The Steering Committee will provide one set of comments on the draft report.
- The Steering Committee will review and provide comments on the draft report within 40 business days.
- The final report will be submitted in April 2020.

2.7 Optional Task 7 – Training

As requested at the pre-scoping meeting on December 5, 2016, we have included an optional task for training. Optional Task 7 could include training to Steering Committee members, their specialized technical consultants, or team members on the next phases of the project (e.g. team members working on the future model predictions) on various software and/or specific aspects of the numerical model. For example, the following aspects of the model development may require training:

- Optional Subtask 7.1 - Software training for the numerical model if MODFLOW is not selected for the project
- Optional Subtask 7.2 - Leapfrog™ training if the raw Leapfrog™ files will be used by others
- Optional Subtask 7.3 - Flow Source training if future predictive modeling will use this software and the group conducting the study is unfamiliar with it
- Optional Subtask 7.4 - An orientation to the numerical model for the group conducting the future predictive model analysis
- Optional Subtask 7.5 - An orientation to the database

These optional training Subtasks have been detailed in the cost estimate as Optional Subtasks 7.1 through 7.5.

2.7.1 Cost Assumptions for Optional Task 7

The cost estimate for Optional Task 7 is based on the following assumptions:

- Orientation to model (Subtask 7.4) and orientation to database (Subtask 7.5) training sessions will each be a 1-day (8-hour) conference call with the appropriate people.

- Each of these training sessions will require 1 day (8 hours) of preparation by Golder.
- The other training session conference calls (Subtasks 7.1 through 7.3) are each assumed to last for 1-2 hours and require a similar effort for preparation.

2.8 Task 8 – Allowance

As requested by the Steering Committee, we have included a task for Project allowance. Task 8 is equivalent to five percent of the total budget, and will be used to cover unanticipated costs incurred during the Project. The allowance shall only be used for changes in condition or additional contractual work requested by the CA#1 Parties. A proposal with scope and fee shall be presented to the CA#1 Parties for review and acceptance. Additional work may proceed after Golder and the CA#1 Parties have signed a Contract Allowance Authorization agreement.

3.0 ESTIMATED COST

The total estimated cost for Golder's services for this Project, including Tasks 1-6 and a 5 percent allowance (Task 8), is **$1,039,500**. The total estimated additional cost for Golder's services for the optional tasks and subtasks, including a 5 percent allowance, is $109,800. The estimated costs are based on our understanding of the scope of work, our knowledge of the site, our experience with other regional groundwater modeling projects, and the assumptions described in the proposal. The assumptions used to develop the cost estimate are listed in the scope of work (Section 2.0) at the end of each task, and incorporate comments received from the Steering Committee during the December 5, 2016 meeting and the January 11, 2017 conference call. The cost estimate is presented in detail in Attachment A, and is summarized by task below in Table 3.

Table 3 - Cost Estimate Summary

Task	Estimated Cost ($)
Task 1 – Project Management	$ 128,900
Task 2 – Project Meetings	$ 145,300
Task 3 – Data Compilation and Existing Model Review	$ 259,700
Task 4 – Conceptual Model Development	$ 91,500
Task 5 – Numerical Model Development	$ 281,200
Task 6 – Groundwater Model Report	$ 83,400
Task 8 – Allowance (Tasks 1-6, without optional subtasks)	$49,500
TOTAL	**$ 1,039,500**
Optional Subtask 5.5 – Refinement of CMs and Calibration	$ 29,500
Optional Subtask 5.7.1 – Groundwater Pumping	$ 17,400
Optional Subtask 5.7.2 – Precipitation Variability	$ 28,700
Optional Subtask 5.7.3 – Tech Memo for Stress Tests	$ 15,700
Optional Task 7 - Training	$ 13,300
Task 8 – Allowance (optional items)	$ 5,200
OPTIONAL ITEMS TOTAL	**$ 109,800**
GRAND TOTAL WITH OPTIONAL ITEMS	**$ 1,149,300**

Notes:
Cost estimate is for Golder labor, expenses, and subcontractors.
Costs are rounded to the nearest $100.
Optional items are not included in the total cost.
Task 8 Allowance is 5% of the total project cost. Allowance is given without options and with options.

If, during the execution of the work, the scope of work must be modified to fit the project needs and cost accruals are expected to change, Golder will notify The City for approval before the work is executed and costs are accrued. Our proposed billing rates for this project are listed in the Professional Rate Schedule provided in Attachment B.

4.0 CONTRACTUAL ARRANGEMENT AND INSURANCE

Golder assumes that the scope of work for the Project will be contracted under a Professional Services Agreement to be originated by the City. Golder understands that the Project will require approval by the City Council. Golder will provide insurance certificates that meet or exceed the limits specified in the Agreement when it is signed.

5.0 PROJECT SCHEDULE

Golder is prepared to begin working on the Project upon receipt of authorization to proceed from the City. We have prepared a Project schedule (Attachment C) with milestones for each task and subtask based on our proposed scope of work, and will work with the Steering Committee to refine the schedule during the Project kickoff meeting. We understand that the Steering Committee is interested in moving forward with the Project as soon as possible and developed the schedule assuming the Project will begin the week of March 8, 2017.

6.0 PROJECT TEAM

Our Project team consists of the five key team members presented in the Statement of Qualifications (SOQ) that we submitted to the City on September 22, 2016:

- Dave Carr, RG – Project Manager
- Mark Birch, RG – Project Director
- Joanna Moreno, PH (GW) – Modeling Director
- Betsy Semmens, RG – Senior Modeler
- Rochelle Destrampe, RG – Data Compilation and Analysis

Emily Clark, Senior Project Scientist, will serve as Project Controller and will track the Project's finances and schedule. Additional Project staff and the qualifications of our Project team members are presented in the SOQ. Golder will staff the Project from the Phoenix, Tucson, Denver, and Albuquerque offices, with support from professional staff in other Golder offices, as needed.

7.0 CLOSING

We appreciate the opportunity to submit this proposal, and we look forward to working with you. If you have any questions or comments, please contact us at (480) 966-0153 or (520) 888-8818.

GOLDER ASSOCIATES INC.

David A. Carr, RG
Associate and Senior Consultant

Mark Birch, RG
Principal and Senior Consultant

cc: Joanna Moreno, RG
Betsy Semmens, RG
Rochelle Destrampe, RG
Emily Clark, CPSS

Attachments: Figure 1 – Preliminary Area for Data Collection
Attachment A – Cost Estimate
Attachment B – Professional Rate Schedule
Attachment C – Project Schedule

DC/MB/js

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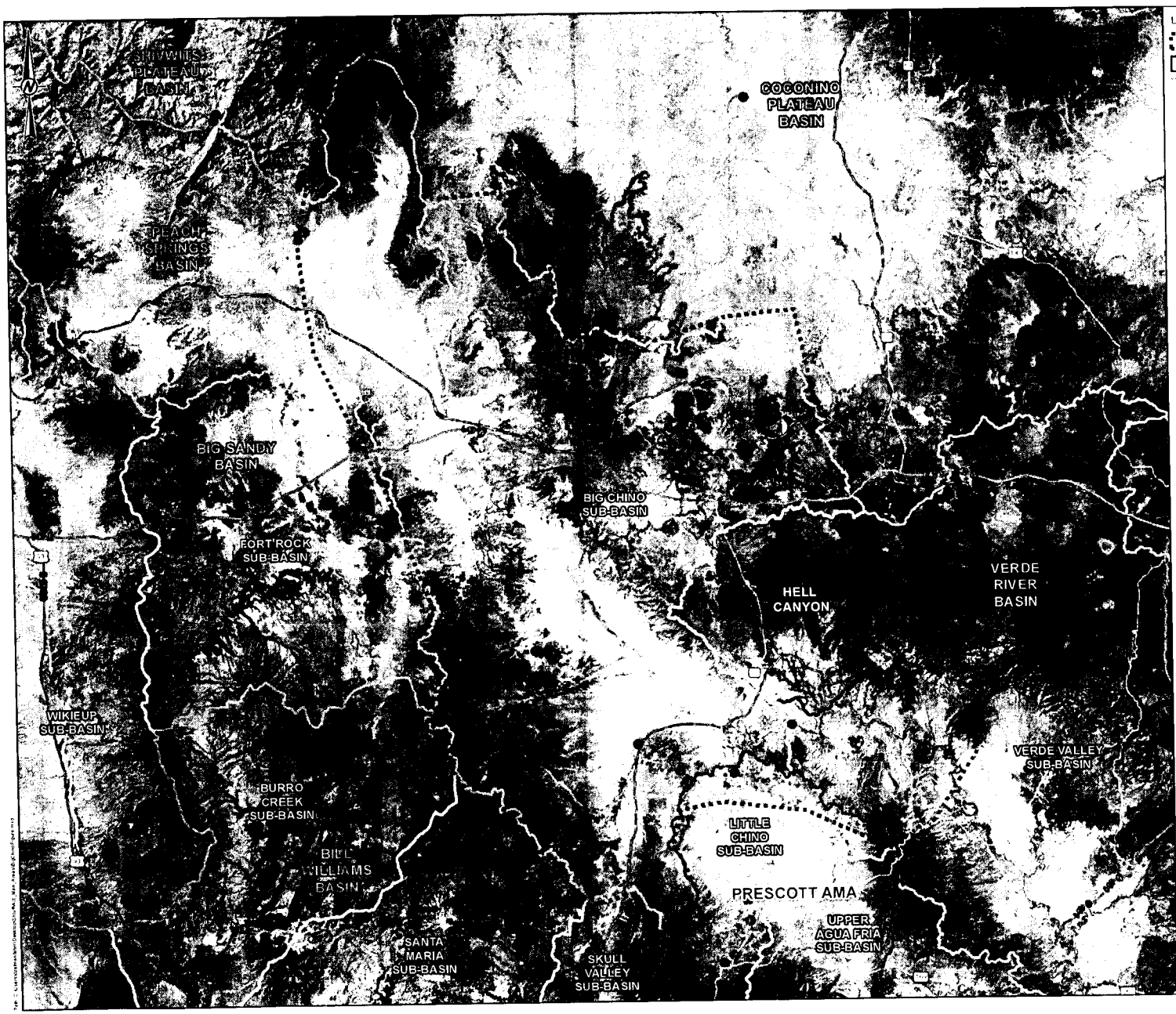
FIGURE



LEGEND

- Preliminary Area for Data Evaluation
- Prescott AMA
- Groundwater Basin
- Groundwater Sub-Basin
- USGS Streamflow Gage Location

NOTES

1. THE NORTHERN AREA OF THE PRESCOTT AMA WILL NEED TO BE REVIEWED FOR GROUNDWATER CONTRIBUTIONS TO THE MODEL DOMAIN
2. THE EASTERN AREA OF BIG SANDY SUB-BASIN WILL BE REVIEWED FOR POSSIBLE GROUNDWATER CONTRIBUTIONS TO THE MODEL DOMAIN

9 4.5 0 9 Miles

1 in = 9 miles

REFERENCE

COORDINATE SYSTEM: NAD 1983 UTM ZONE 12N.
AERIAL IMAGE: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP), USDA FARM SERVICE AGENCY, IMAGE TAKEN 6/2/2015.

CLIENT
COMPREHENSIVE AGREEMENT NO. 1 STEERING COMMITTEE

PROJECT
BIG CHINO GROUNDWATER FLOW MODEL

TITLE
PRELIMINARY AREA FOR DATA COLLECTION

CONSULTANT

Golder Associates

PROGRAMMED	2/2/2017
PLOTTED	DZF
DESIGN	DZF
REVIEW	BS
APPROVED	DC

PROJECT NO. P1662614 | CONTROL — | REV — | FIGURE 1

ATTACHMENT A
COST ESTIMATE

Golder Associates Inc.
Big Chino Sub-basin Groundwater Model Cost Estimate Detail
February 2, 2017

USD <-- Currency

2016 Rates

Time & Materials <-- Project Type

file name

Task #	Subtask #	Description	Labor Total	Expenses	Total	C6 Project Director $ 195 MB	C6 Project Manager $ 195 DC	C6 Senior Consultant $ 195 JM	C5 Senior Scientist $ 175 BS	C4 Senior Project Scientist $ 150 RD/EC/SW	C3 Project Engineer / Scientist $ 125 EM/EP	C2 Staff Engineer / Scientist $ 105 HP	T4 Senior Project Technician $ 120 DZ	B3 Senior Admin Support $ 90	B2 Staff Admin Support $ 80	Total Labor Hours	Total Labor Cost	Expenses: Round-Trip Air Fare (DEN to PHX) @450	Ground Transport (PHX) @$100	Lodging and Per Diem @ $185/day	Miscellaneous Expenses	Total Disbursement
1	****	**Project Management**	$ 50,850	$ -	$ 50,850	18	180			72					18	288.0	$ 50,850	$ -	$ -	$ -	$ -	$ -
1	1	Communication	$ 65,430	$ -	$ 65,430	18	144			216					18	396.0	$ 65,430	$ -	$ -	$ -	$ -	$ -
1	2	Financial Management	$ 12,600	$ -	$ 12,600				72							72.0	$ 12,600	$ -	$ -	$ -	$ -	$ -
1	3	Technical Management	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
2	****	**Project Meetings**	$ 6,130	$ -	$ 6,130	4	8	7	7	8						34.0	$ 6,130	$ -	$ -	$ -	$ -	$ -
2	1	Kick-off Meeting	$ 29,125	$ 4,750	$ 33,875	32	29	34	34	31						160.0	$ 29,125	$ 900	$ 400	$ 3,330	$ 120	$ 4,750
2	2	Site Reconnaissance	$ 34,320	$ -	$ 34,320		48	48	48	48						192.0	$ 34,320	$ -	$ -	$ -	$ -	$ -
2	3	Steering Committee Conference Calls	$ 53,400	$ 5,010	$ 58,410		66	126	48	12			48			300.0	$ 53,400	$ 2,700	$ 1,200	$ 1,110	$ -	$ 5,010
2	4	In-Person Meetings at SRP	$ 10,950	$ 1,655	$ 12,605	7	9	14	18	13						61.0	$ 10,950	$ 900	$ 200	$ 555	$ -	$ 1,655
2	5	End of Project Meeting	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
3	****	**Data Compilation and Model Review**	$ 26,400	$ -	$ 26,400		8	8	8	60	80		24			188.0	$ 26,400	$ -	$ -	$ -	$ -	$ -
3	1	Data Compilation	$ 31,200	$ -	$ 31,200				8	72	152					232.0	$ 31,200	$ -	$ -	$ -	$ -	$ -
3	2.1	Data Management - Database	$ 28,380	$ -	$ 28,380				36				184			220.0	$ 28,380	$ -	$ -	$ -	$ -	$ -
3	2.2	Data Management - ArcGIS	$ 21,580	$ -	$ 21,580				52				104			156.0	$ 21,580	$ -	$ -	$ -	$ -	$ -
3	2.3	Data Management - Leapfrog	$ 13,200	$ -	$ 13,200					88						88.0	$ 13,200	$ -	$ -	$ -	$ -	$ -
3	2.4	Data Management - Other	$ 21,540	$ -	$ 21,540		12			96			40			148.0	$ 21,540	$ -	$ -	$ -	$ -	$ -
3	3.1	Data Analysis - Cross Sections	$ 17,310	$ -	$ 17,310		2	16	16	40	40					114.0	$ 17,310	$ -	$ -	$ -	$ -	$ -
3	3.2	Data Analysis - Timeseries	$ 17,070	$ -	$ 17,070		2	24	40		40					106.0	$ 17,070	$ -	$ -	$ -	$ -	$ -
3	3.3	Data Analysis - Spatial	$ 16,690	$ -	$ 16,690		2	40	20		40					102.0	$ 16,690	$ -	$ -	$ -	$ -	$ -
3	3.4	Data Analysis - Other	$ 22,200	$ -	$ 22,200			60	60							120.0	$ 22,200	$ -	$ -	$ -	$ -	$ -
3	4	Existing Model Review	$ 15,370	$ -	$ 15,370	2	4	6	6	40	8		40	2		108.0	$ 15,370	$ -	$ -	$ -	$ -	$ -
3	5.1	Tech Memo (1 of 3) - Initial Data Compilation	$ 15,550	$ -	$ 15,550	2	4	8	40			8	40	2		104.0	$ 15,550	$ -	$ -	$ -	$ -	$ -
3	5.2	Tech Memo (2 of 3) - Leapfrog	$ 13,230	$ -	$ 13,230	2	4	8	8	40	8		16	2		88.0	$ 13,230	$ -	$ -	$ -	$ -	$ -
3	5.3	Tech Memo (3 of 3) - Final Data Compilation	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
4	****	**Conceptual Model Development**	$ 26,850	$ -	$ 26,850		4	45	45	50			16			160.0	$ 26,850	$ -	$ -	$ -	$ -	$ -
4	1	Review/Alterations of Existing CMs	$ 12,220	$ -	$ 12,220		4	16	16	24			16			76.0	$ 12,220	$ -	$ -	$ -	$ -	$ -
4	2	Develop New Conceptual Models	$ 26,430	$ -	$ 26,430		4	45	45	60						154.0	$ 26,430	$ -	$ -	$ -	$ -	$ -
4	3	Initial Water Budget	$ 4,520	$ -	$ 4,520			16	8							24.0	$ 4,520	$ -	$ -	$ -	$ -	$ -
4	4	Assess Multiple CMs	$ 21,430	$ -	$ 21,430	2	4	40	40	16			24	2		128.0	$ 21,430	$ -	$ -	$ -	$ -	$ -
4	5	Technical Memoradum for CMs	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
5	****	**Numerical Model Development**	$ 1,910	$ -	$ 1,910			8	2							10.0	$ 1,910	$ -	$ -	$ -	$ -	$ -
5	1	Model Selection	$ 29,680	$ -	$ 29,680			24	40		120	24	4			212.0	$ 29,680	$ -	$ -	$ -	$ -	$ -
5	2	Numerical Model Construction	$ 7,680	$ -	$ 7,680	2	2	8	24				8	2		46.0	$ 7,680	$ -	$ -	$ -	$ -	$ -
5	3.1	Technical Memoranda for Numerical Model Development (1 of 2)	$ 7,680	$ -	$ 7,680	2	2	8	24				8	2		46.0	$ 7,680	$ -	$ -	$ -	$ -	$ -
5	3.2	Technical Memoranda for Numerical Model Development (2 of 2)	$ 22,860	$ -	$ 22,860			40	40		40	20	8			148.0	$ 22,860	$ -	$ -	$ -	$ -	$ -
5	4.1	Calibration Approach	$ 65,600	$ -	$ 65,600			80			400					480.0	$ 65,600	$ -	$ -	$ -	$ -	$ -
5	4.2	Parameter Estimation (Calibration)	$ 64,000	$ -	$ 64,000				80		400					480.0	$ 64,000	$ -	$ -	$ -	$ -	$ -
5	4.3	Incorporate Various Conceptual Models	$ 24,240	$ -	$ 24,240			24	24		96	32				176.0	$ 24,240	$ -	$ -	$ -	$ -	$ -
5	4.4	Sensitivity Analyses	$ 13,790	$ -	$ 13,790		2	20	20		48					90.0	$ 13,790	$ -	$ -	$ -	$ -	$ -
5	4.5	Evaluation of Groundwater Flow Paths	$ 14,880	$ -	$ 14,880			24	24		48					96.0	$ 14,880	$ -	$ -	$ -	$ -	$ -
5	4.6	Uncertainty Analysis for flows to UVS	$ 29,520	$ -	$ 29,520			36	36		96	40				208.0	$ 29,520	$ -	$ -	$ -	$ -	$ -
5	5	Refinement of CMs and Adjustment of Calibration (Optional)	$ 13,210	$ -	$ 13,210	2	2	10	24		20	16	16	2		92.0	$ 13,210	$ -	$ -	$ -	$ -	$ -
5	6.1	Technical Memoranda for Model Calibration Approach	$ 15,710	$ -	$ 15,710	2	2	10	24		40	16	16	2		112.0	$ 15,710	$ -	$ -	$ -	$ -	$ -
5	6.2	Technical Memoranda for Model Calibration	$ 17,400	$ -	$ 17,400			20	20		80					120.0	$ 17,400	$ -	$ -	$ -	$ -	$ -
5	7.1	Groundwater Pumping (Optional)	$ 28,700	$ -	$ 28,700			60	40		80					180.0	$ 28,700	$ -	$ -	$ -	$ -	$ -
5	7.2	Precipitation Variability (Optional)	$ 15,710	$ -	$ 15,710	2	2	10	24		40	16	16	2		112.0	$ 15,710	$ -	$ -	$ -	$ -	$ -
5	7.3	Technical Memoranda for Stress Tests (Optional)	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
6	****	**Groundwater Model Report**	$ 57,850	$ -	$ 57,850	10	20	80	80		40	40	80	40		390.0	$ 57,850	$ -	$ -	$ -	$ -	$ -
6	1	Draft Report	$ 25,500	$ -	$ 25,500	10	10	20	40		10	10	40	40		180.0	$ 25,500	$ -	$ -	$ -	$ -	$ -
6	2	Final Report	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
7	****	**Training (Optional)**	$ 780	$ -	$ 780			4					4			4.0	$ 780	$ -	$ -	$ -	$ -	$ -
7	1	Numerical Code	$ 1,180	$ -	$ 1,180				4							8.0	$ 1,180	$ -	$ -	$ -	$ -	$ -
7	2	Leapfrog	$ 700	$ -	$ 700				4							4.0	$ 700	$ -	$ -	$ -	$ -	$ -
7	3	Flow Source	$ 5,920	$ -	$ 5,920			16	16							32.0	$ 5,920	$ -	$ -	$ -	$ -	$ -
7	4	Model Orientation	$ 4,720	$ -	$ 4,720				16				16			32.0	$ 4,720	$ -	$ -	$ -	$ -	$ -
7	5	Database	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
8	****	**Allowance**	$ -	$ -	$ 54,731											0.0	$ -	$ -	$ -	$ -	$ -	$ -
8	1	Allowance	$ 1,083,195	$ 11,415	$ 1,149,341	117	580	1,063	1,281	986	1,926	222	768	98	36	7,077	$ 1,083,195	$ 4,500	$ 1,800	$ 4,995	$ 120	$ 11,415
TOTAL		TOTAL				*Percent of Time* 2%	9%	17%	21%	16%	31%	4%	12%	2%	1%							

February 2, 2017

Task 1 Assumptions (Labor)

		Staff/Level							Total (per year)	Total (for project)
		MB	DC	JM	BS	EC	RD	B2		
1.1	Communication	6	6	6	5	4	4	2		
	# hours General (per month)	0.5	4					0.5	60	180
	# hours Progress Reports (per month)		1			2			36	108
	Total Hours (per year)	6	60			24		6	96	288
	Total Hours (for project)	18	180			72		18		
1.2	Financial Management									
	# hours budget tracking and invoicing (per mo)		4						48	144
	# hours progress tracking and schedule updates (per mo)					6			72	216
	# hours general (per mo)	0.5						0.5	12	36
	Total Hours (per year)	6	48			72		6	132	396
	Total Hours (for project)	18	144			216		18		
1.3	Technical Management									
	# hours communication (per mo)				2				24	72
	Total Hours (per year)				24					
	Total Hours (for project)				72					

Task 2 Assumptions (Labor)

		Staff/Level						Total (per year)	Total (for project)
		MB	DC	JM	BS	RD	DZ		
		6	6	6	5	4	T4		
2.1	Kick off Conference Call								
	# hours (mtg) ea.	2	2	2	2	2	0	10	10
	# hours (prep) ea.	2	4	4	4	4	0	18	18
	# hours (travel) ea.	0	0	0	0	0	0	0	0
	# hours (minutes) ea.	0	2	1	1	2	0	6	6
	Total Hours	**4**	**8**	**7**	**7**	**8**	**0**	**34**	**34**
2.2	Site Reconnasiance (3 days)								
	# hours (mtg) ea.	24	24	24	24	24	0	120	120
	# hours (prep) ea.	0	1	0	0	3	0	4	4
	# hours (travel) ea.	8	4	10	10	4	0	36	36
	# hours (minutes) ea.	0	0	0	0	0	0	0	0
	Total Hours	**32**	**29**	**34**	**34**	**31**	**0**	**160**	**160**
2.3	Steering Committee Conference Calls (4 per year for a total of 12)								
	# hours (mtg) ea.	0	2	2	2	2	0	32	96
	# hours (prep) ea.	0	1	1	1	1	0	16	48
	# hours (travel) ea.	0	0	0	0	0	0	0	0
	# hours (minutes) ea.	0	1	1	1	1	0	16	48
	Total Hours (per year)	**0**	**16**	**16**	**16**	**16**	**0**	**64**	**192**
	Total Hours (for project)	**0**	**48**	**48**	**48**	**48**	**0**		
2.4	All day (6-hour), in-person meetings at SRP (Multi-agency or other purpose) (2 per year for a total of 6)								
	# hours (mtg) ea.	0	6	6	0	0	0	24	72
	# hours (prep) ea.	0	2	4	8	2	8	32	96
	# hours (travel) ea.	0	1	7	0	0	0	16	48
	# hours (minutes) ea.	0	2	4	0	0	0	12	36
	Total Hours (per year)	**0**	**22**	**42**	**16**	**4**	**16**	**84**	**252**
	Total Hours (for project)	**0**	**66**	**126**	**48**	**12**	**48**		
2.5	(New sub-task), In-person, 2-hour End of Project Meeting at SRP								
	# hours (mtg) ea.	2	2	2	2	2	0	10	10
	# hours (prep) ea.	1	4	4	8	8	0	25	25
	# hours (travel) ea.	4	1	7	7	1	0	20	20
	# hours (minutes) ea.	0	2	1	1	2	0	6	6
	Total Hours	**7**	**9**	**14**	**18**	**13**	**0**	**61**	**61**

Task 2 Assumptions (Expenses)

		Staff/Level					Total (per year)	Total (for project)	Assumption
		MB	DC	JM	BS	RD			
		6	6	6	5	4			
2.1	Kick off Meeting in Prescott								
	Airfare (Denver to Phoenix)						$ -	$ -	
	Ground Transportation (Phoenix)						$ -	$ -	
	Lodging & Per Diem						$ -	$ -	
	Total Cost	$ -	$ -	$ -	$ -		$ -	$ -	
2.2	Site Reconnasiance (3 days)								
	Airfare (Denver to Phoenix)			$ 450.00	$ 450.00		$ 900.00	$ 900.00	
	Ground Transportation (Phoenix)	$ 400.00					$ 400.00	$ 400.00	$100/day. MB travels from Tucson in rental
	Lodging & Per Diem	$ 740.00	$ 555.00	$ 740.00	$ 740.00	$ 555.00	$ 3,330.00	$ 3,330.00	$185/night. Four nights each for BS, JM, and MB. Three nights each for DC and RD.
	Total Cost	$ 1,140.00	$ 555.00	$ 1,190.00	$ 1,190.00	$ 555.00	$ 4,630.00	$ 4,630.00	
2.3	Steering Committee Conference Calls (4 per year for a total of 12)								
	Airfare (Denver to Phoenix)						$ -	$ -	
	Ground Transportation (Phoenix)						$ -	$ -	
	Lodging & Per Diem						$ -	$ -	
	Total Cost						$ -	$ -	
2.4	All day, in-person meetings at SRP (Multi-agency or other purpose) (2 per year for a total of 6)								
	Airfare (Denver to Phoenix) (ea)			$ 450.00			$ 900.00	$ 2,700.00	Assumes one Denver staff
	Ground Transportation (Phoenix)			$ 200.00			$ 400.00	$ 1,200.00	$100/day. JM or BS rents vehicle in Phoenix
	Lodging & Per Diem			$ 185.00			$ 370.00	$ 1,110.00	$185/night. One night for each meeting for either BS or JM.
	Total Cost						$ 1,670.00	$ 5,010.00	
2.5	(New sub-task), In-person, 2-hour End of Project Meeting at SRP								
	Airfare (Denver to Phoenix)			$ 450.00	$ 450.00		$ 900.00	$ 900.00	
	Ground Transportation (Phoenix)	$ 200.00					$ 200.00	$ 200.00	$100/day. MB travels from Tucson in rental car
	Lodging & Per Diem	$ 185.00		$ 185.00	$ 185.00		$ 555.00	$ 555.00	$185/night. One night each MB, JM, BS
	Total Cost	$ 385.00	$ -	$ 635.00	$ 635.00	$ -	$ 1,655.00	$ 1,655.00	
							Total	**$ 11,295.00**	

Labor Assumptions for Tasks 3 - 7

Task	Subtask	Description	Duration			MB		DC		JM		BS		RD		SW/Other		LM/Other		HP		DZ		Admin	Sum	Sum	% change	Assumptions
			days	wks	mo	6		6		6		5		4		4		3		2		T4		B3	(new)	(initial)		
						rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	hrs	hours	hours		
3	****	**Data Compilation and Model Review**		0	0																				0	0		
3	1	Data Compilation		0	0				8		8		8	24 initial + 1 hr/mo duration	60			8 initial + 2 hrs/mo dur	80			24 hrs initial	24		188	258	-27	3 hours/month over duration of project
3	2.1	Data Management - Database		0	0								8	2 hrs/mo duration	72			80 hrs + 2 hr/mo durat	152						232	380	-39	4 hours/month over duration of project
3	2.2	Data Management - ArcGIS		0	0							1 hr/mo duration	36									40 hrs + 4 hrs/mo durat	184		220	376	-41	5 hours/month over duration of project
3	2.3	Data Management - Leapfrog		0	0							half	52									80 hrs + 24 hrs revision	104		156	156	0	
3	2.4	Data Management - General		0	0									16 hrs + 2 hrs/mo duration	88										88	190	-54	2 hours/month over duration of project
3	3.1	Data Analysis - Cross Sections		0	0			2 per section	12							16 hrs per section 6 sections	96					for georeferencing	40		148	200	-26	
3	3.2	Data Analysis - Timeseries		0	0				2		16		16		40				40						114	188	-39	Assumes database is already substantially reported and no reanalysis of geophysics or geochemistry data or aquifer pumping test results
3	3.3	Data Analysis - Spatial		0	0				2		24		40						40						106	188	-44	
3	3.4	Data Analysis - BCM, etc		0	0				2		40		20						40						102	204	-50	
3	4	Existing Model Review		0	0					10 hrs per model	60	10 hrs per model	60												120	120	0	10 hours per model for Senior modelers
3	5.1	Tech Memo (1 of 3) - Initial Data Compilation		0	0		2		4		6		6		40				8				40	2	108	102	6	Tech memos will be brief and casual in format
3	5.2	Tech Memo (2 of 3) - Leapfrog		0	0		2		4		8		40								8		40	2	104	102	2	
3	5.3	Tech Memo (3 of 3) - Final Data Compilation/Analysis		0	0		2		4		8		8		40				8				16	2	88	86	2	
4	****	**Conceptual Model Development**		0	0																				0	0		
4	1	Review/Alterations of Existing CMs		0	0				4		45		45		50								16		160	248	-35	Limited effort will be expended in developing or updating alternate CMs
4	2	Develop New Conceptual Models		0	0				4		16		16		24								16		76	144	-47	
4	3	Initial Water Budget		0	0				4	10.5hrs * 4 CMs	45	10.5 hrs * 4 CMs	45		60										154	144	7	
4	4	Assess Multiple CMs		0	0						16		8												24	24	0	Range of results will be provided instead of formal multi-model assessment
4	5	Technical Memoradum for CMs		0	0		2		4		40		40		16								24	2	128	174	-26	
5	****	**Numerical Model Development**		0	0																				0	0		
5	1	Model Selection	10	2	0.5					20% duration	8		2												10	24	-58	The comparison already provided in the draft proposal will be included in the final repor
5	2	Numerical Model Construction	80	16	4					1/2 level 5	24	1/2 level 3	40					25% duration	120	1/2 level 3	24		4		212	400	-47	Assume only 2 models will be built
5	3.1	Technical Memoranda for Numerical Model Development (1 of 2)		0	0		2		2		8		24										8	2	46	94	-51	Tech memos will be brief and casual in format
5	3.2	Technical Memoranda for Numerical Model Development (2 of 2)		0	0		2		2		8		24										8	2	46	94	-51	
5	4.1	Calibration Approach	20	4	1				2	25% duration	40	25% duration	40					25% duration	40	1/2 level 3	20		8		150	152	-1	
5	4.2	Parameter Estimation (Calibration)	120	24	6					10% duration	80							50% for 1 person	400						480	580	-17	Model 1
5	4.3	Incorporate Various Conceptual Models	122	24.4	6.1							10% duration	80					50% for 1 person	400						480	576	-17	Model 2
5	4.4	Sensitivity Analyses	80	16	4						24		24					25% duration	96	1/2 level 3	32				176	192	-8	
5	4.5	Evaluation of Groundwater Flow Paths	80	16	4				2	1/2 level 3	20	1/2 level 3	20					12% duration	48						90	100	-10	
5	4.6	Uncertainty Analysis for flows to UVS	80	16	4					1/2 level 3	24	1/2 level 3	24					12% duration	48						96	96	0	
5	5	Refinement of CMs and Adjustment of Calibration (Optional)	120	24	6						36		36						96		40				208	226	-8	CM and numerical model development will not be revisited
5	6.1	Technical Memoranda for Model Calibration Approach		0	0		2		2		10		24						20		16		16	2	92	120	-23	Tech memos will be brief and casual in format
5	6.2	Technical Memoranda for Model Calibration		0	0		2		2		10		24						40		16		16	2	112	160	-30	
5	7.1	Groundwater Pumping (Optional)		0	0						20		20					2 weeks	80						120	186	-35	a hypothetical future pumping case will not be considered
5	7.2	Precipitation Variability (Optional)		0	0						60		40					2 weeks	80						180	226	-20	climate change will not be considered
5	7.3	Technical Memoranda for Stress Tests (Optional)		0	0		2		2		10		24						40		16		16	2	112	150	-25	CM and numerical model development will not be revisited
6	****	**Groundwater Model Report**		0	0																				0	0		
6	1	Draft Report		0	0		10		20		80		80						40		40		80	40	390	360	8	
6	2	Final Report		0	0		10		10		20		40						10		10		40	40	180	240	-25	limited number of review comments assumed
7	****	**Training (Optional)**																								0		
7	1	Numerical Code									4														4	16	-75	2 hours training
7	2	Leapfrog											4										4		8	32	-75	2 hours training
7	3	Flow Source											4												4	16	-75	2 hours training
7	4	Model Orientation									16		16												32	32	0	8 hours training
7	5	Database											16										16		32	32	0	8 hours training

ATTACHMENT B
PROFESSIONAL RATE SCHEDULE

GOLDER ASSOCIATES INC.
PROFESSIONAL RATE SCHEDULE

Invoices from Golder Associates Inc. include all labor charges, other direct costs, and costs associated with in-house services. Charges include only those services directly attributable to the execution of the work. Time spent when traveling in the interest of the work will be charged in accordance with the hourly rates. Rates for Professional services related to expert testimony, including time spent in depositions and the preparation and presentations of testimony, are available upon request.

Labor charges are based upon standard hourly billing rates for each category of staff. The billing rates include costs for salary, payroll taxes, insurance associated with employment, benefits (including holiday, sick leave, and vacation), administrative overheads, and profit. Rates by labor category are as follows:

Billing Level	***Personnel Category***	***Hourly Rate (U.S.$)***
B1	Admin Support	$ 70
B2	Staff Admin Support	$ 80
B3	Senior Admin Support	$ 90
T1	Technician	$ 80
T2	Staff Technician	$ 100
T3	Project Technician	$ 110
T4	Senior Project Technician	$ 120
D1	Draftsperson	$ 85
D2	Staff Draftsperson	$ 100
D3	Senior Draftsperson	$ 120
C1	Engineer/Scientist	$ 95
C2	Staff Engineer/Scientist	$ 105
C3	Project Engineer/Scientist	$ 125
C4	Senior Project Engineer/Scientist	$ 150
C5	Senior Engineer/Scientist	$ 175
C6	Senior Consultant	$ 195
C7	Practice/Program Leader	$ 215

Other direct costs, including materials, travel, subsistence, and subcontractor costs, will be invoiced at cost, with no markup.

The Office Service Fee (or Communications Fee), which is typically charged for direct project non-labor office costs including software licensing, mail, telephone, fax transmissions, personal computers as well as reasonable and customary in-house photocopying, will not be billed. Costs for outsourced photocopies or drawing reproduction will be billed at the following rates:

SERVICE	**RATE**
Color Photocopies	$0.10/page
Color Plotter (D&E size)	$16/plot

Rates for laboratory services and use of equipment owned by Golder Associates Inc. will be provided upon request.

The rates listed above are valid through May 2020.

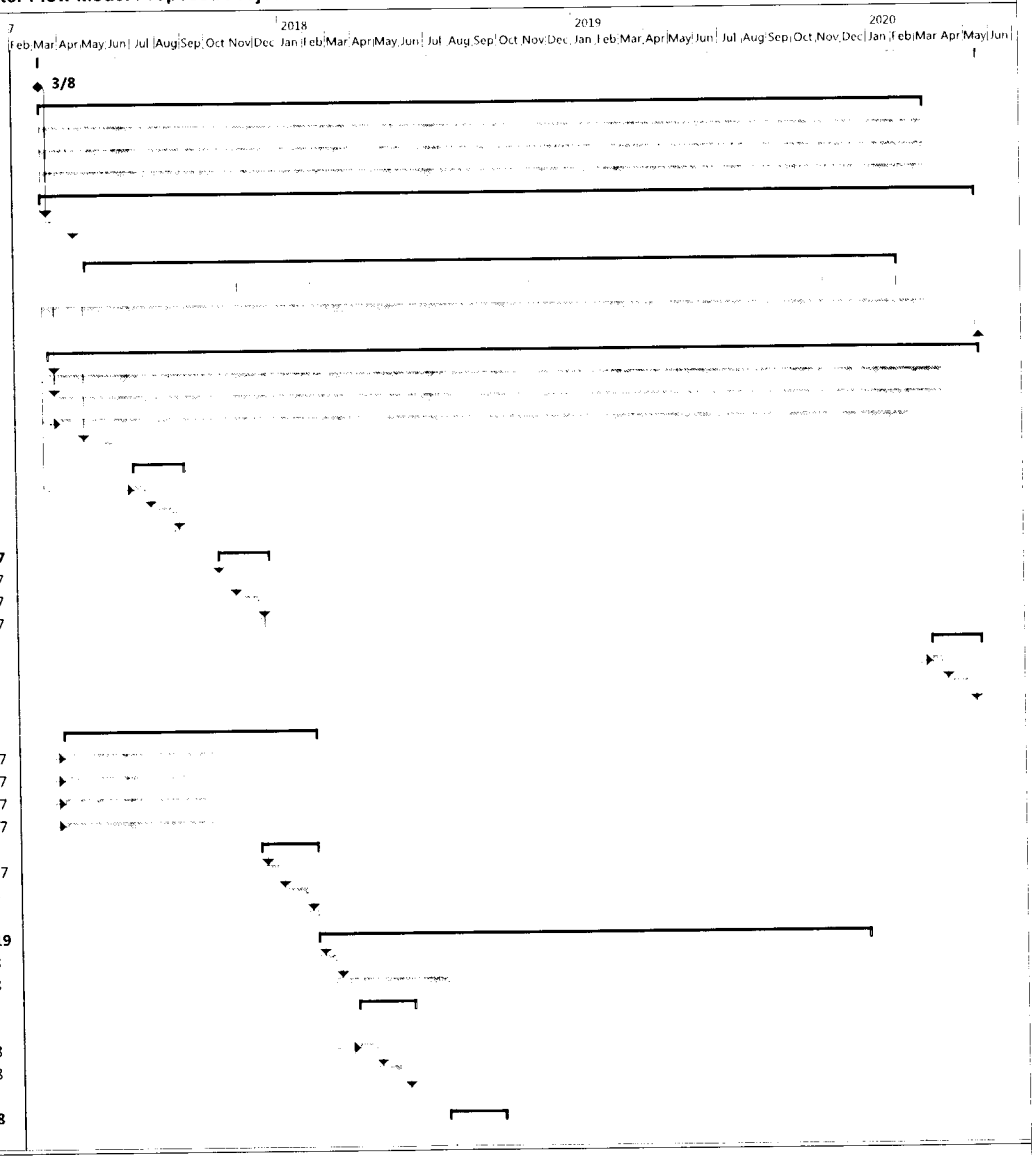
ATTACHMENT C
PROJECT SCHEDULE

February 2017

Big Chino Sub-Basin Groundwater Flow Model Proposed Project Schedule

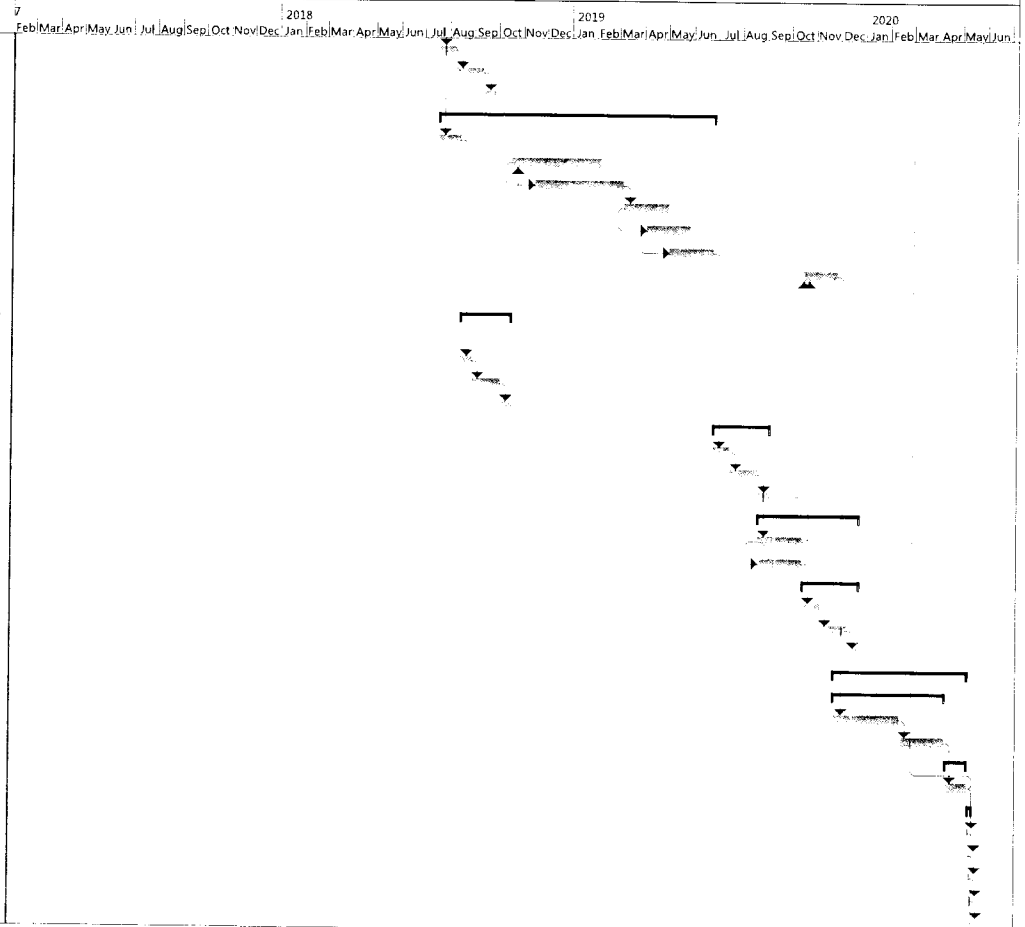
P1662614

ID	Task Mode	Text1	Task Name	Duration	Start	Finish
0			**Big Chino Sub-Basin Groundwater Flow Model**	**833 days**	**3/8/17**	**5/15/20**
1			Notice to Proceed	0 days	3/8/17	3/8/17
2		**1.******	**Project Management**	**784 days**	**3/8/17**	**3/9/20**
3		1.1	Communication	784 days	3/8/17	3/9/20
4		1.2	Financial Management	784 days	3/8/17	3/9/20
5		1.3	Technical Management	784 days	3/8/17	3/9/20
6		**2.******	**Project Meetings**	**829 days**	**3/8/17**	**5/11/20**
7		2.1	Kick-off Meeting	1 day	3/15/17	3/15/17
8		2.2	Site Reconnaissance	3 days	4/18/17	4/20/17
9		**2.3**	**Steering Committee Meetings**	**721 days**	**5/2/17**	**2/4/20**
10			**Quarterly Steering Committee Conference Calls**	**721 days**	**5/2/17**	**2/4/20**
23		2.4	In-Person Meetings at SRP	784 days	3/8/17	3/9/20
24		2.5	End of Project Meeting at SRP	1 day	5/11/20	5/11/20
25		**3.******	**Data Compilation and Model Review**	**827 days**	**3/16/17**	**5/15/20**
26		3.1	Data Compilation	796 days	3/16/17	4/2/20
27		3.2	Data Management	796 days	3/16/17	4/2/20
28		3.3	Data Analysis	755 days	3/30/17	2/19/20
29		3.4	Existing Model Review	30 days	4/24/17	6/2/17
30		**3.5.1**	**Tech Memo (1 of 3) - Initial Data Compilation**	**45 days**	**6/29/17**	**8/30/17**
31			TM1 Draft	10 days	6/29/17	7/12/17
32			TM1 Committee Review	25 days	7/13/17	8/16/17
33			TM1 Final	10 days	8/17/17	8/30/17
34		**3.5.2**	**Tech Memo (2 of 3) - Leap Frog**	**45 days**	**10/12/17**	**12/13/17**
35			TM2 Draft	10 days	10/12/17	10/25/17
36			TM2 Committee Review	25 days	10/26/17	11/29/17
37			TM2 Final	10 days	11/30/17	12/13/17
38		**3.5.3**	**Tech Memo (3 of 3) - Final Data Compilation**	**45 days**	**3/16/20**	**5/15/20**
39			TM3 Draft	10 days	3/16/20	3/27/20
40			TM3 Committee Review	25 days	3/30/20	5/1/20
41			TM3 Final	10 days	5/4/20	5/15/20
42		**4.******	**Conceptual Model Development**	**225 days**	**3/30/17**	**2/7/18**
43		4.1	Review/Alterations of Existing CMs	140 days	3/30/17	10/11/17
44		4.2	Develop New CMs	140 days	3/30/17	10/11/17
45		4.3	Initial Water Budget	140 days	3/30/17	10/11/17
46		4.4	Assess Multiple CMs	140 days	3/30/17	10/11/17
47		**4.5**	**Technical Memoradum for CMs**	**50 days**	**11/30/17**	**2/7/18**
48			CM TM Draft	15 days	11/30/17	12/20/17
49			CM TM Committee Review	25 days	12/21/17	1/24/18
50			CM TM Final	10 days	1/25/18	2/7/18
51		**5.******	**Numerical Model Development**	**490 days**	**2/8/18**	**12/25/19**
52		5.1	Model Selection	15 days	2/8/18	2/28/18
53		5.2	Numerical Model Construction	100 days	3/1/18	7/18/18
54		**5.3.1**	**Technical Memoranda for Numerical Model Development Approach**	**50 days**	**3/29/18**	**6/6/18**
55			Model TM 1 Draft	15 days	3/29/18	4/18/18
56			Model TM 1 Committee Review	25 days	4/19/18	5/23/18
57			Model TM 1 Final	10 days	5/24/18	6/6/18
58		**5.3.2**	**Technical Memoranda for Numerical Model Development**	**50 days**	**7/19/18**	**9/26/18**



Big Chino Sub-Basin Groundwater Flow Model Proposed Project Schedule

ID	Task Mode	Text1	Task Name	Duration	Start	Finish
59			Model TM 2 Draft	15 days	7/19/18	8/8/18
60			Model TM 2 Committee Review	25 days	8/9/18	9/12/18
61			Model TM 2 Final	10 days	9/13/18	9/26/18
62		**5.4**	**Numerical Model Calibration**	**245 days**	**7/19/18**	**6/26/19**
63		5.4.1	Calibration Approach	20 days	7/19/18	8/15/18
64		5.4.2	Parameter Estimation (Calibration)	80 days	10/18/18	2/6/19
65		5.4.3	Incorporate Various CMs	80 days	11/15/18	3/6/19
66		5.4.4	Sensitivity Analyses	40 days	3/7/19	5/1/19
67		5.4.5	Evaluation of Groundwater Flow Paths	40 days	4/4/19	5/29/19
68		5.4.6	Uncertainty Analysis for flows to UVS	40 days	5/2/19	6/26/19
69		5.5	Refinement of CMs and Adjustment of Calibration (Optional)	30 days	10/17/19	11/27/19
70		**5.6.1**	**Technical Memoranda for Model Calibration Approach**	**45 days**	**8/16/18**	**10/17/18**
71			Model Cal Approach TM Draft	10 days	8/16/18	8/29/18
72			Model Cal Approach TM Committee Review	25 days	8/30/18	10/3/18
73			Model Cal Approach TM Final	10 days	10/4/18	10/17/18
74		**5.6.2**	**Technical Memoranda for Model Calibration**	**50 days**	**6/27/19**	**9/4/19**
75			Model Cal TM Draft	15 days	6/27/19	7/17/19
76			Model Cal TM Committee Review	25 days	7/18/19	8/21/19
77			Model Cal TM Final	10 days	8/22/19	9/4/19
78		**5.7**	**Stress Tests (Optional)**	**90 days**	**8/22/19**	**12/25/19**
79		5.7.1	Groundwater Pumping	40 days	8/22/19	10/16/19
80		5.7.2	Precipitation Variability	40 days	8/22/19	10/16/19
81		**5.7.3**	**Technical Memoranda for Stress Tests**	**50 days**	**10/17/19**	**12/25/19**
82			Stress Test TM Draft	15 days	10/17/19	11/6/19
83			Stress Test TM Committee Review	25 days	11/7/19	12/11/19
84			Stress Test TM Final	10 days	12/12/19	12/25/19
85		**6.******	**Groundwater Model Report**	**120 days**	**11/25/19**	**5/8/20**
86		**6.1**	**Draft Report**	**100 days**	**11/25/19**	**4/10/20**
87			Draft Report	60 days	11/25/19	2/14/20
88			Draft Report Committee Review	40 days	2/17/20	4/10/20
89		**6.2**	**Final Report**	**20 days**	**4/13/20**	**5/8/20**
90			Final Report	20 days	4/13/20	5/8/20
91		**7.******	**Training (Optional)**	**5 days**	**5/11/20**	**5/15/20**
92		7.1	Numerical Code	1 day	5/11/20	5/11/20
93		7.2	Leapfrog	1 day	5/12/20	5/12/20
94		7.3	Flow Source	1 day	5/13/20	5/13/20
95		7.4	Model Orientation	1 day	5/14/20	5/14/20
96		7.5	Database	1 day	5/15/20	5/15/20



CONTRACT TRACKING SHEET

CITY OF PRESCOTT
Everybody's Hometown

CONTRACT NO: 2017-246

For Contract Review –
1st Step: City Clerk will assign a contract number (if Council action is required, get number first and include in Council Agenda Memo)
2nd Step: Route Contract and applicable documents through Legal Department
***** Certificate of Liability/Insurance MUST be attached. Please include the expiration date.**

PROCESS – NOTE: The Legal Department MUST review all IGAs, Easements, Lease/Property Acquisition and Development Agreements as well as all Contracts. Must be reviewed and signed off by both Risk Manager & Legal Department prior to any action taken.

Please fill out this form completely or it will be returned to you prior to review, approval, or scanning in OnBase. If a response is not applicable, please use "N/A" - Do Not Leave Any Blanks.

Type (check one):

- [x] Contract
- [ ] Change Order/Modification (How many change orders are connected to this contract? _____)
  ORIGINAL CONTRACT NO: _____ for this change order
- [ ] Amendment (How many amendments are connected to this contract? _____)
  ORIGINAL CONTRACT NO: _____ for this amendment
- [ ] IGA
- [ ] Lease/Property Acquisition
- [ ] General Services
- [ ] Development Agreement
- [x] Professional Services
- [ ] License Agreement
- Other: please specify:
- [ ] Construction
- [ ] Easement

IDENTIFYING INFORMATION: (Please fill in each field)

Requesting Dept., Contact Name, Ext. #:
Public Works, Erika 1656

Contractor or Vendor Name, Address, Tel. No.:
Golder Associates, Inc
1430 W. Broadway Rd, Ste108
Tempe, AZ 85282

Project Name
Development of a Big Chino Sub-basin Groundwater Flow Model

Ord/Res No: _____ if applicable

Brief Summary of the Services to be provided:
Development of a Big Chino Sub-basin Groundwater Flow Model

Terms:
Start: 02/28/17 Expire: 03/31/20
Contract Amount: $ 1,149,300.00
Does contract require Council approval? [x] Yes [ ] No
Scheduled Council Date:
Does document need to be recorded [ ] Yes [x] No

ADDITIONAL COMMENTS/INSTRUCTIONS? Please sign and date all three copies and return two to Candace.

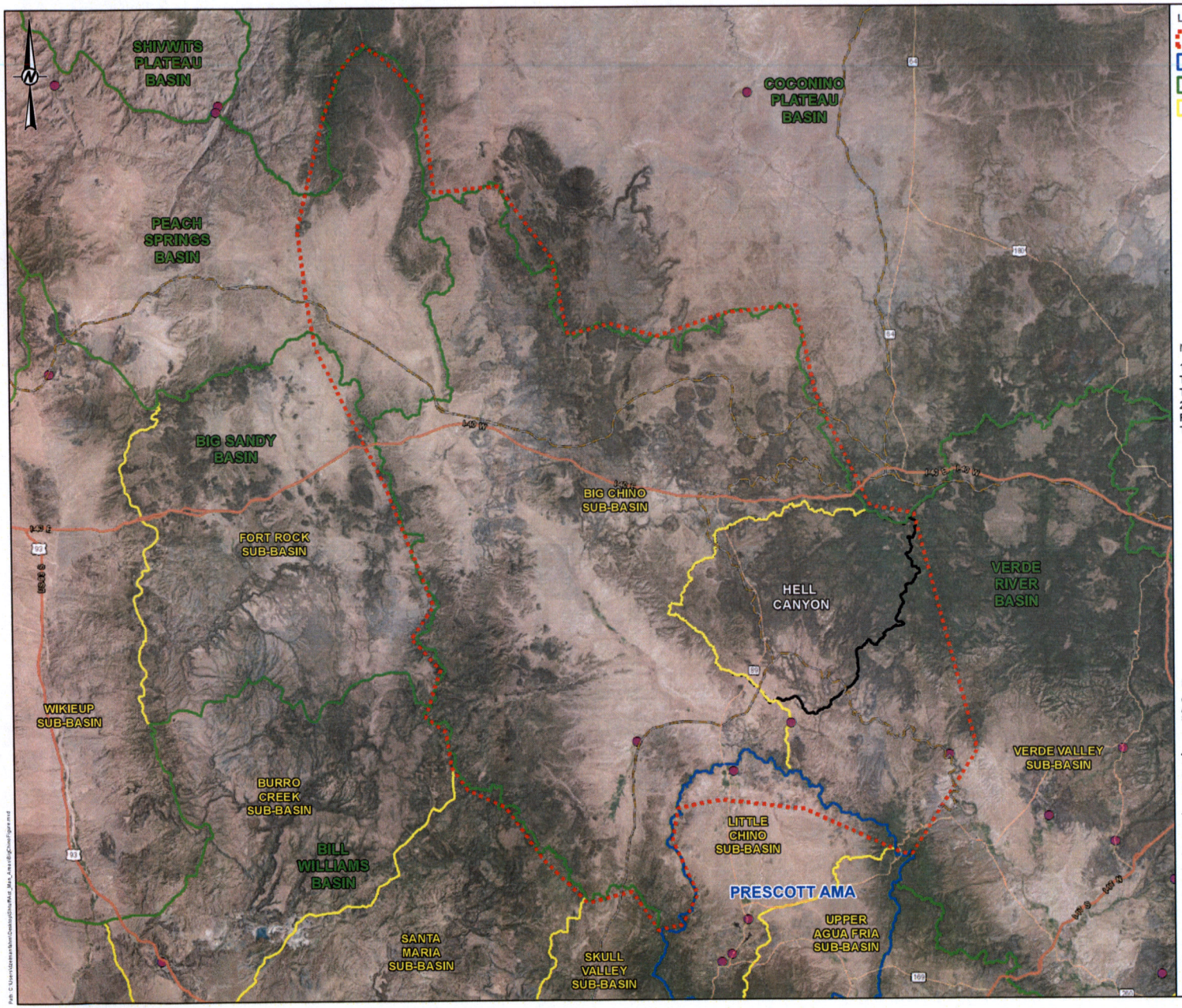
INSURANCE & BONDS

None Required [ ]

Insurance Certificate:	[x] Attached	_____ Initial	Date: 05/01/16	Exp. Date 5/1/17
Bid Bond:	[ ] Attached	_____ Initial	Date: _____	
Performance Bond:	[ ] Attached	_____ Initial	Date: _____	
Payment Bond:	[ ] Attached	_____ Initial	Date: _____	

FINAL REVIEW AND APPROVAL: *Please initial*

[ ] Legal: _____	Date: _____	Contracts/Procured Services
[ ] Risk Mgmt: _____	Date: _____	Contracts and Certificates
[ ] City Manager: _____	Date: _____	when required



LEGEND

- Preliminary Area for Data Evaluation
- Prescott AMA
- Groundwater Basin
- Groundwater Sub-Basin
- USGS Streamflow Gage Location

NOTES

1. THE NORTHERN AREA OF THE PRESCOTT AMA WILL NEED TO BE REVIEWED FOR GROUNDWATER CONTRIBUTIONS TO THE MODEL DOMAIN
2. THE EASTERN AREA OF BIG SANDY SUB-BASIN WILL BE REVIEWED FOR POSSIBLE GROUNDWATER CONTRIBUTIONS TO THE MODEL DOMAIN

9 4.5 0 9 Miles

1 in = 9 miles

REFERENCE

COORDINATE SYSTEM: NAD 1983 UTM ZONE 12N
AERIAL IMAGE: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP), USDA FARM SERVICE AGENCY, IMAGE TAKEN 6/2/2015.

CLIENT
COMPREHENSIVE AGREEMENT NO. 1 STEERING COMMITTEE

PROJECT
BIG CHINO GROUNDWATER FLOW MODEL

TITLE
PRELIMINARY AREA FOR DATA COLLECTION

CONSULTANT
Golder Associates

YYYY-MM-DD	2/2/2017
PREPARED	DZF
DESIGN	DZF
REVIEW	BS
APPROVED	DC

PROJECT No. P1662614 | CONTROL — | Rev. — | FIGURE 1

ATTACHMENT A
COST ESTIMATE

Golder Associates Inc.
Big Chino Sub-basin Groundwater Model Cost Estimate Detail
February 2, 2017

USD <-- Currency

2016 Rates

Time & Materials <-- Project Type

file name

Task #	Subtask #	Description	Labor Total	Expenses	Total	C6 Project Director $ 195 MB	C6 Project Manager $ 195 DC	C6 Senior Consultant $ 195 JM	C5 Senior Scientist $ 175 BS	C4 Senior Project Scientist $ 150 RD/EC/SW	C3 Project Engineer / Scientist $ 125 EM/EP	C2 Staff Engineer / Scientist $ 105 HP	T4 Senior Project Technician $ 120 DZ	B3 Senior Admin Support $ 90	B2 Staff Admin Support $ 80	Total Labor Hours	Total Labor Cost	Expenses: Round-Trip Air Fare (DEN to PHX) @450	Expenses: Ground Tranport (PHX) @$100	Expenses: Lodging and Per Diem @ $165/day	Expenses: Miscellaneous Expensese	Total Disbursement
1	****	**Project Management**	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
1	1	Communication	$ 50,850	$ -	$ 50,850	18	180			72					18	288.0	$ 50,850	$ -	$ -	$ -	$ -	$ -
1	2	Financial Management	$ 65,430	$ -	$ 65,430	18	144			216					18	396.0	$ 65,430	$ -	$ -	$ -	$ -	$ -
1	3	Technical Management	$ 12,600	$ -	$ 12,600				72							72.0	$ 12,600	$ -	$ -	$ -	$ -	$ -
2	****	**Project Meetings**	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
2	1	Kick-off Meeting	$ 6,130	$ -	$ 6,130	4	8	7	7	8						34.0	$ 6,130	$ -	$ -	$ -	$ -	$ -
2	2	Site Reconnaissance	$ 29,125	$ 4,750	$ 33,875	32	29	34	34	31						160.0	$ 29,125	$ 900	$ 400	$ 3,330	$ 120	$ 4,750
2	3	Steering Committee Conference Calls	$ 34,320	$ -	$ 34,320		48	48	48	48						192.0	$ 34,320				$ -	$ -
2	4	In-Person Meetings at SRP	$ 53,400	$ 5,010	$ 58,410		66	126	48	12			48			300.0	$ 53,400	$ 2,700	$ 1,200	$ 1,110	$ -	$ 5,010
2	5	End of Project Meeting	$ 10,950	$ 1,655	$ 12,605	7	9	14	18	13						61.0	$ 10,950	$ 900	$ 200	$ 555	$ -	$ 1,655
3	****	**Data Compilation and Model Review**	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
3	1	Data Compilation	$ 26,400	$ -	$ 26,400		8	8	8	60	80		24			188.0	$ 26,400	$ -	$ -	$ -	$ -	$ -
3	2.1	Data Management - Database	$ 31,200	$ -	$ 31,200				8	72	152					232.0	$ 31,200	$ -	$ -	$ -	$ -	$ -
3	2.2	Data Management - ArcGIS	$ 28,380	$ -	$ 28,380				36				184			220.0	$ 28,380	$ -	$ -	$ -	$ -	$ -
3	2.3	Data Management - Leapfrog	$ 21,580	$ -	$ 21,580				52				104			156.0	$ 21,580	$ -	$ -	$ -	$ -	$ -
3	2.4	Data Management - Other	$ 13,200	$ -	$ 13,200					88						88.0	$ 13,200	$ -	$ -	$ -	$ -	$ -
3	3.1	Data Analysis - Cross Sections	$ 21,540	$ -	$ 21,540		12			96			40			148.0	$ 21,540	$ -	$ -	$ -	$ -	$ -
3	3.2	Data Analysis - Timeseries	$ 17,310	$ -	$ 17,310		2	16	16	40	40					114.0	$ 17,310	$ -	$ -	$ -	$ -	$ -
3	3.3	Data Analysis - Spatial	$ 17,070	$ -	$ 17,070		2	24	40		40					106.0	$ 17,070	$ -	$ -	$ -	$ -	$ -
3	3.4	Data Analysis - Other	$ 16,690	$ -	$ 16,690		2	40	20		40					102.0	$ 16,690	$ -	$ -	$ -	$ -	$ -
3	4	Existing Model Review	$ 22,200	$ -	$ 22,200			60	60							120.0	$ 22,200	$ -	$ -	$ -	$ -	$ -
3	5.1	Tech Memo (1 of 3) - Initial Data Compliation	$ 15,370	$ -	$ 15,370	2	4	6	6	40	8		40	2		108.0	$ 15,370	$ -	$ -	$ -	$ -	$ -
3	5.2	Tech Memo (2 of 3) - Leapfrog	$ 15,550	$ -	$ 15,550	2	4	8	40			8	40	2		104.0	$ 15,550	$ -	$ -	$ -	$ -	$ -
3	5.3	Tech Memo (3 of 3) - Final Data Compilation	$ 13,230	$ -	$ 13,230	2	4	8	8	40	8		16	2		88.0	$ 13,230	$ -	$ -	$ -	$ -	$ -
4	****	**Conceptual Model Development**	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
4	1	Review/Alterations of Existing CMs	$ 26,850	$ -	$ 26,850		4	45	45	50			16			160.0	$ 26,850	$ -	$ -	$ -	$ -	$ -
4	2	Develop New Conceptual Models	$ 12,220	$ -	$ 12,220		4	16	16	24			16			76.0	$ 12,220	$ -	$ -	$ -	$ -	$ -
4	3	Initial Water Budget	$ 26,430	$ -	$ 26,430		4	45	45	60						154.0	$ 26,430	$ -	$ -	$ -	$ -	$ -
4	4	Assess Multiple CMs	$ 4,520	$ -	$ 4,520			16	8							24.0	$ 4,520	$ -	$ -	$ -	$ -	$ -
4	5	Technical Memoradum for CMs	$ 21,430	$ -	$ 21,430	2	4	40	40	16			24	2		128.0	$ 21,430	$ -	$ -	$ -	$ -	$ -
5	****	**Numerical Model Development**	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
5	1	Model Selection	$ 1,910	$ -	$ 1,910			8	2							10.0	$ 1,910	$ -	$ -	$ -	$ -	$ -
5	2	Numerical Model Construction	$ 29,680	$ -	$ 29,680			24	40		120	24	4			212.0	$ 29,680	$ -	$ -	$ -	$ -	$ -
5	3.1	Technical Memoranda for Numerical Model Development (1 of 2)	$ 7,680	$ -	$ 7,680	2	2	8	24				8	2		46.0	$ 7,680	$ -	$ -	$ -	$ -	$ -
5	3.2	Technical Memoranda for Numerical Model Development (2 of 2)	$ 7,680	$ -	$ 7,680	2	2	8	24				8	2		46.0	$ 7,680	$ -	$ -	$ -	$ -	$ -
5	4.1	Calibration Approach	$ 22,860	$ -	$ 22,860			40	40		40	20	8			148.0	$ 22,860	$ -	$ -	$ -	$ -	$ -
5	4.2	Parameter Estimation (Calibration)	$ 65,600	$ -	$ 65,600			80			400					480.0	$ 65,600	$ -	$ -	$ -	$ -	$ -
5	4.3	Incorporate Various Conceptual Models	$ 64,000	$ -	$ 64,000				80		400					480.0	$ 64,000	$ -	$ -	$ -	$ -	$ -
5	4.4	Sensitivity Analyses	$ 24,240	$ -	$ 24,240			24	24		96	32				176.0	$ 24,240	$ -	$ -	$ -	$ -	$ -
5	4.5	Evaluation of Groundwater Flow Paths	$ 13,790	$ -	$ 13,790		2	20	20		48					90.0	$ 13,790	$ -	$ -	$ -	$ -	$ -
5	4.6	Uncertainty Analysis for flows to UVS	$ 14,880	$ -	$ 14,880			24	24		48					96.0	$ 14,880	$ -	$ -	$ -	$ -	$ -
5	5	Refinement of CMs and Adjustment of Calibration (Optional)	$ 29,520	$ -	$ 29,520			36	36		96	40				208.0	$ 29,520	$ -	$ -	$ -	$ -	$ -
5	6.1	Technical Memoranda for Model Calibration Approach	$ 13,210	$ -	$ 13,210	2	2	10	24		20	16	16	2		92.0	$ 13,210	$ -	$ -	$ -	$ -	$ -
5	6.2	Technical Memoranda for Model Calibration	$ 15,710	$ -	$ 15,710	2	2	10	24		40	16	16	2		112.0	$ 15,710	$ -	$ -	$ -	$ -	$ -
5	7.1	Groundwater Pumping (Optional)	$ 17,400	$ -	$ 17,400			20	20		80					120.0	$ 17,400	$ -	$ -	$ -	$ -	$ -
5	7.2	Precipitation Variability (Optional)	$ 28,700	$ -	$ 28,700			60	40		80					180.0	$ 28,700	$ -	$ -	$ -	$ -	$ -
5	7.3	Technical Memoranda for Stress Tests (Optional)	$ 15,710	$ -	$ 15,710	2	2	10	24		40	16	16	2		112.0	$ 15,710	$ -	$ -	$ -	$ -	$ -
6	****	**Groundwater Model Report**	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
6	1	Draft Report	$ 57,850	$ -	$ 57,850	10	20	80	80		40	40	80	40		390.0	$ 57,850	$ -	$ -	$ -	$ -	$ -
6	2	Final Report	$ 25,500	$ -	$ 25,500	10	10	20	40		10	10	40	40		180.0	$ 25,500	$ -	$ -	$ -	$ -	$ -
7	****	**Training (Optional)**	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
7	1	Numerical Code	$ 780	$ -	$ 780			4								4.0	$ 780	$ -	$ -	$ -	$ -	$ -
7	2	Leapfrog	$ 1,180	$ -	$ 1,180				4				4			8.0	$ 1,180	$ -	$ -	$ -	$ -	$ -
7	3	Flow Source	$ 700	$ -	$ 700				4							4.0	$ 700	$ -	$ -	$ -	$ -	$ -
7	4	Model Orientation	$ 5,920	$ -	$ 5,920			16	16							32.0	$ 5,920	$ -	$ -	$ -	$ -	$ -
7	5	Database	$ 4,720	$ -	$ 4,720				16				16			32.0	$ 4,720	$ -	$ -	$ -	$ -	$ -
8	****	**Allowance**	$ -	$ -	$ -											0.0	$ -	$ -	$ -	$ -	$ -	$ -
8	1	Allowance	$ -	$ -	$ 54,731											0.0	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL		TOTAL	$ 1,083,195	$ 11,415	$ 1,149,341	117	580	1,063	1,281	986	1,926	222	768	98	36	7,077	$ 1,083,195	$ 4,500	$ 1,800	$ 4,995	$ 120	$ 11,415
					Percent of Time	2%	9%	17%	21%	16%	31%	4%	12%	2%	1%							

Task 1 Assumptions (Labor)

		Staff/Level							Total (per year)	Total (for project)
		MB	DC	JM	BS	EC	RD	B2		
		6	6	6	5	4	4	2		
1.1	Communication									
	# hours General (per month)	0.5	4					0.5	60	180
	# hours Progress Reports (per month)		1			2			36	108
	Total Hours (per year)	6	60			24		6	96	288
	Total Hours (for project)	18	180			72		18		
1.2	Financial Management									
	# hours budget tracking and invoicing (per mo)		4						48	144
	# hours progress tracking and schedule updates (per mo)					6			72	216
	# hours general (per mo)	0.5						0.5	12	36
	Total Hours (per year)	6	48			72		6	132	396
	Total Hours (for project)	18	144			216		18		
1.3	Technical Management									
	# hours communication (per mo)				2				24	72
	Total Hours (per year)				24					
	Total Hours (for project)				72					

Task 2 Assumptions (Labor)

		Staff/Level						Total (per year)	Total (for project)
		MB	DC	JM	BS	RD	DZ		
		6	6	6	5	4	T4		
2.1	Kick off Conference Call								
	# hours (mtg) ea.	2	2	2	2	2	0	10	10
	# hours (prep) ea.	2	4	4	4	4	0	18	18
	# hours (travel) ea.	0	0	0	0	0	0	0	0
	# hours (minutes) ea.	0	2	1	1	2	0	6	6
	Total Hours	**4**	**8**	**7**	**7**	**8**	**0**	**34**	**34**
2.2	Site Reconnasiance (3 days)								
	# hours (mtg) ea.	24	24	24	24	24	0	120	120
	# hours (prep) ea.	0	1	0	0	3	0	4	4
	# hours (travel) ea.	8	4	10	10	4	0	36	36
	# hours (minutes) ea.	0	0	0	0	0	0	0	0
	Total Hours	**32**	**29**	**34**	**34**	**31**	**0**	**160**	**160**
2.3	Steering Committee Conference Calls (4 per year for a total of 12)								
	# hours (mtg) ea.	0	2	2	2	2	0	32	96
	# hours (prep) ea.	0	1	1	1	1	0	16	48
	# hours (travel) ea.	0	0	0	0	0	0	0	0
	# hours (minutes) ea.	0	1	1	1	1	0	16	48
	Total Hours (per year)	**0**	**16**	**16**	**16**	**16**	**0**	**64**	**192**
	Total Hours (for project)	**0**	**48**	**48**	**48**	**48**	**0**		
2.4	All day (6-hour), in-person meetings at SRP (Multi-agency or other purpose) (2 per year for a total of 6)								
	# hours (mtg) ea.	0	6	6	0	0	0	24	72
	# hours (prep) ea.	0	2	4	8	2	8	32	96
	# hours (travel) ea.	0	1	7	0	0	0	16	48
	# hours (minutes) ea.	0	2	4	0	0	0	12	36
	Total Hours (per year)	**0**	**22**	**42**	**16**	**4**	**16**	**84**	**252**
	Total Hours (for project)	**0**	**66**	**126**	**48**	**12**	**48**		
2.5	(New sub-task), In-person, 2-hour End of Project Meeting at SRP								
	# hours (mtg) ea.	2	2	2	2	2	0	10	10
	# hours (prep) ea.	1	4	4	8	8	0	25	25
	# hours (travel) ea.	4	1	7	7	1	0	20	20
	# hours (minutes) ea.	0	2	1	1	2	0	6	6
	Total Hours	**7**	**9**	**14**	**18**	**13**	**0**	**61**	**61**

Golder Associates

Task 2 Assumptions (Expenses)

		Staff/Level					Total (per year)	Total (for project)	Assumption
		MB	DC	JM	BS	RD			
		6	6	6	5	4			
2.1	Kick off Meeting in Prescott								
	Airfare (Denver to Phoenix)						$ -	$ -	
	Ground Transportation (Phoenix)						$ -	$ -	
	Lodging & Per Diem						$ -	$ -	
	Total Cost	$ -	$ -	$ -	$ -		$ -	$ -	
2.2	Site Reconnasiance (3 days)								
	Airfare (Denver to Phoenix)			$ 450.00	$ 450.00		$ 900.00	$ 900.00	
	Ground Transportation (Phoenix)	$ 400.00					$ 400.00	$ 400.00	$100/day. MB travels from Tucson in rental
	Lodging & Per Diem	$ 740.00	$ 555.00	$ 740.00	$ 740.00	$ 555.00	$ 3,330.00	$ 3,330.00	$185/night. Four nights each for BS, JM, and MB. Three nights each for DC and RD.
	Total Cost	$ 1,140.00	$ 555.00	$ 1,190.00	$ 1,190.00	$ 555.00	$ 4,630.00	$ 4,630.00	
2.3	Steering Committee Conference Calls (4 per year for a total of 12)								
	Airfare (Denver to Phoenix)						$ -	$ -	
	Ground Transportation (Phoenix)						$ -	$ -	
	Lodging & Per Diem						$ -	$ -	
	Total Cost						$ -	$ -	
2.4	All day, in-person meetings at SRP (Multi-agency or other purpose) (2 per year for a total of 6)								
	Airfare (Denver to Phoenix) (ea)			$ 450.00			$ 900.00	$ 2,700.00	Assumes one Denver staff
	Ground Transportation (Phoenix)			$ 200.00			$ 400.00	$ 1,200.00	$100/day. JM or BS rents vehicle in Phoenix
	Lodging & Per Diem			$ 185.00			$ 370.00	$ 1,110.00	$185/night. One night for each meeting for either BS or JM.
	Total Cost						$ 1,670.00	$ 5,010.00	
2.5	(New sub-task), In-person, 2-hour End of Project Meeting at SRP								
	Airfare (Denver to Phoenix)			$ 450.00	$ 450.00		$ 900.00	$ 900.00	
	Ground Transportation (Phoenix)	$ 200.00					$ 200.00	$ 200.00	$100/day. MB travels from Tucson in rental car
	Lodging & Per Diem	$ 185.00		$ 185.00	$ 185.00		$ 555.00	$ 555.00	$185/night. One night each MB, JM, BS
	Total Cost	$ 385.00	$ -	$ 635.00	$ 635.00	$ -	$ 1,655.00	$ 1,655.00	
							Total	**$ 11,295.00**	

Labor Assumptions for Tasks 3 - 7

Task	Subtask	Description	Duration			MB		DC		JM		BS		RD		SW/Other		LM/Other		HP		DZ		Admin	Sum	Sum	% change	Assumptions
			days	wks	mo	6		6		6		5		4		4		3		2		T4		B3	(new)	(initial)		
						rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	rationale	hrs	hrs	hours	hours		
3	****	**Data Compilation and Model Review**		0	0																				0	0		
3	1	Data Compilation		0	0					8		8		8	60			8 initial + 2 hrs/mo dura	80			24 hrs initial	24		188	258	-27	3 hours/month over duration of project
3	2.1	Data Management - Database		0	0									8	72			80 hrs + 2 hrs/mo durati	152						232	380	-39	4 hours/month over duration of project
3	2.2	Data Management - ArcGIS		0	0							1 hr/mo duration	36									40 hrs + 4 hrs/mo durati	184		220	376	-41	5 hours/month over duration of project
3	2.3	Data Management - Leapfrog		0	0							half	52									80 hrs + 24 hrs revision	104		156	156	0	
3	2.4	Data Management - General		0	0									16 hrs + 2 hrs/mo duration	88										88	190	-54	2 hours/month over duration of project
3	3.1	Data Analysis - Cross Sections		0	0			2 per section	12							16 hrs per section, 6 sections	96					for georeferencing	40		148	200	-26	
3	3.2	Data Analysis - Timeseries		0	0				2		16		16		40				40						114	188	-39	Assumes database is already substantially reported and no reanalysis of geophysics or
3	3.3	Data Analysis - Spatial		0	0				2		24		40						40						106	188	-44	geochemistry data or aquifer pumping test results
3	3.4	Data Analysis - BCM, etc		0	0				2		40		20						40						102	204	-50	
3	4	Existing Model Review		0	0					10 hrs per model	60	10 hrs per model	60												120	120	0	10 hours per model for Senior modelers
3	5.1	Tech Memo (1 of 3) - Initial Data Compilation		0	0		2		4		6		6		40				8				40	2	108	102	6	Tech memos will be brief and casual in format
3	5.2	Tech Memo (2 of 3) - Leapfrog		0	0		2		4		8		40								8		40	2	104	102	2	
3	5.3	Tech Memo (3 of 3) - Final Data Compilation/Analysis		0	0		2		4		8		8		40				8				16	2	88	86	2	
4	****	**Conceptual Model Development**		0	0																				0	0		
4	1	Review/Alterations of Existing CMs		0	0				4		45		45		50								16		160	248	-35	Limited effort will be expended in developing or updating alternate CMs
4	2	Develop New Conceptual Models		0	0				4		16		16		24								16		76	144	-47	
4	3	Initial Water Budget		0	0				4	10 .5hrs * 4 CMs	45	10.5 hrs * 4 CMs	45		60										154	144	7	
4	4	Assess Multiple CMs		0	0						16		8												24	24	0	Range of results will be provided instead of formal multi-model assessment
4	5	Technical Memoradum for CMs		0	0		2		4		40		40		16								24	2	128	174	-26	
5	****	**Numerical Model Development**		0	0																				0	0		
5	1	Model Selection	10	2	0.5					20% duration	8		2												10	24	-58	The comparison already provided in the draft proposal will be included in the final repor
5	2	Numerical Model Construction	80	16	4					1/2 level 5	24	1/2 level 3	40					25% duration	120	1/2 level 3	24		4		212	400	-47	Assume only 2 models will be built
5	3.1	Technical Memoranda for Numerical Model Development (1 of 2)		0	0		2		2		8		24										8	2	46	94	-51	Tech memos will be brief and casual in format
5	3.2	Technical Memoranda for Numerical Model Development (2 of 2)		0	0		2		2		8		24										8	2	46	94	-51	
5	4.1	Calibration Approach	20	4	1				2	25% duration	40	25% duration	40					25% duration	40	1/2 level 3	20		8		150	152	-1	
5	4.2	Parameter Estimation (Calibration)	120	24	6					10% duration	80							50% for 1 person	400						480	580	-17	Model 1
5	4.3	Incorporate Various Conceptual Models	122	24.4	6.1							10% duration	80					50% for 1 person	400						480	576	-17	Model 2
5	4.4	Sensitivity Analyses	80	16	4						24		24					25% duration	96	1/2 level 3	32				176	192	-8	
5	4.5	Evaluation of Groundwater Flow Paths	80	16	4				2	1/2 level 3	20	1/2 level 3	20					12% duration	48						90	100	-10	
5	4.6	Uncertainty Analysis for flows to UVS	80	16	4					1/2 level 3	24	1/2 level 3	24					12% duration	48						96	96	0	
5	5	Refinement of CMs and Adjustment of Calibration (Optional)	120	24	6						36		36						96		40				208	226	-8	CM and numerical model development will not be revisited
5	6.1	Technical Memoranda for Model Calibration Approach		0	0		2		2		10		24						20		16		16	2	92	120	-23	Tech memos will be brief and casual in format
5	6.2	Technical Memoranda for Model Calibration		0	0		2		2		10		24						40		16		16	2	112	160	-30	
5	7.1	Groundwater Pumping (Optional)		0	0						20		20					2 weeks	80						120	186	-35	a hypothetical future pumping case will not be considered
5	7.2	Precipitation Variability (Optional)		0	0						60		40					2 weeks	80						180	226	-20	climate change will not be considered
5	7.3	Technical Memoranda for Stress Tests (Optional)		0	0		2		2		10		24						40		16		16	2	112	150	-25	CM and numerical model development will not be revisited
6	****	**Groundwater Model Report**		0	0																				0	0		
6	1	Draft Report		0	0		10		20		80		80						40		40		80	40	390	360	8	
6	2	Final Report		0	0		10		10		20		40						10		10		40	40	180	240	-25	limited number of review comments assumed
7	****	Training (Optional)																								0		
7	1	Numerical Code									4														4	16	-75	2 hours training
7	2	Leapfrog											4										4		8	32	-75	2 hours training
7	3	Flow Source											4												4	16	-75	2 hours training
7	4	Model Orientation									16		16												32	32	0	8 hours training
7	5	Database											16										16		32	32	0	8 hours training

ATTACHMENT B
PROFESSIONAL RATE SCHEDULE

GOLDER ASSOCIATES INC.
PROFESSIONAL RATE SCHEDULE

Invoices from Golder Associates Inc. include all labor charges, other direct costs, and costs associated with in-house services. Charges include only those services directly attributable to the execution of the work. Time spent when traveling in the interest of the work will be charged in accordance with the hourly rates. Rates for Professional services related to expert testimony, including time spent in depositions and the preparation and presentations of testimony, are available upon request.

Labor charges are based upon standard hourly billing rates for each category of staff. The billing rates include costs for salary, payroll taxes, insurance associated with employment, benefits (including holiday, sick leave, and vacation), administrative overheads, and profit. Rates by labor category are as follows:

Billing Level	***Personnel Category***	***Hourly Rate (U.S.$)***
B1	Admin Support	$ 70
B2	Staff Admin Support	$ 80
B3	Senior Admin Support	$ 90
T1	Technician	$ 80
T2	Staff Technician	$ 100
T3	Project Technician	$ 110
T4	Senior Project Technician	$ 120
D1	Draftsperson	$ 85
D2	Staff Draftsperson	$ 100
D3	Senior Draftsperson	$ 120
C1	Engineer/Scientist	$ 95
C2	Staff Engineer/Scientist	$ 105
C3	Project Engineer/Scientist	$ 125
C4	Senior Project Engineer/Scientist	$ 150
C5	Senior Engineer/Scientist	$ 175
C6	Senior Consultant	$ 195
C7	Practice/Program Leader	$ 215

Other direct costs, including materials, travel, subsistence, and subcontractor costs, will be invoiced at cost, with no markup.

The Office Service Fee (or Communications Fee), which is typically charged for direct project non-labor office costs including software licensing, mail, telephone, fax transmissions, personal computers as well as reasonable and customary in-house photocopying, will not be billed. Costs for outsourced photocopies or drawing reproduction will be billed at the following rates:

SERVICE	**RATE**
Color Photocopies	$0.10/page
Color Plotter (D&E size)	$16/plot

Rates for laboratory services and use of equipment owned by Golder Associates Inc. will be provided upon request.

The rates listed above are valid through May 2020.

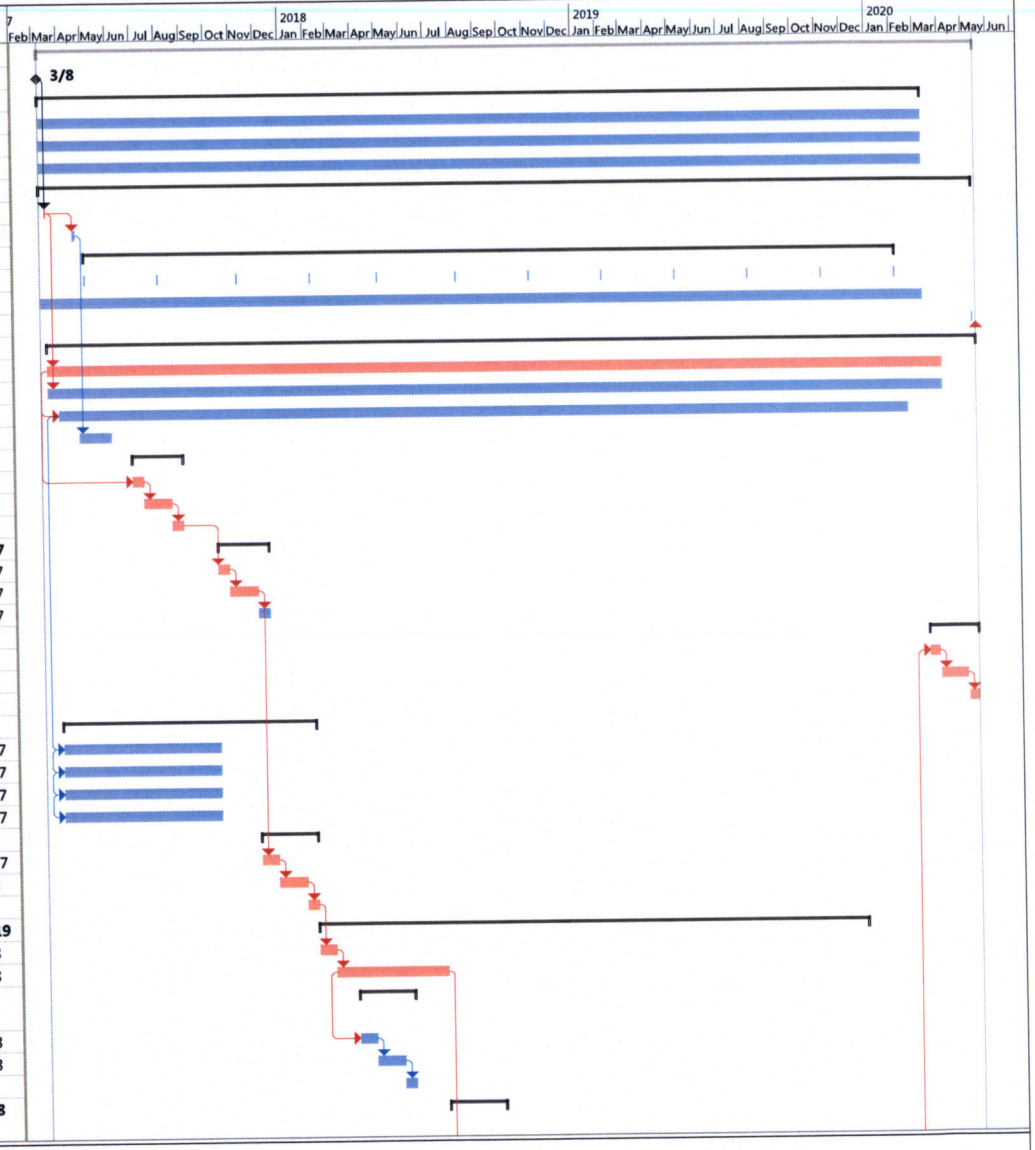
ATTACHMENT C
PROJECT SCHEDULE

February 2017

Big Chino Sub-Basin Groundwater Flow Model Proposed Project Schedule

P1662614

ID	Task Mode	Text1	Task Name	Duration	Start	Finish
0			**Big Chino Sub-Basin Groundwater Flow Model**	**833 days**	**3/8/17**	**5/15/20**
1			Notice to Proceed	0 days	3/8/17	3/8/17
2		**1.******	**Project Management**	**784 days**	**3/8/17**	**3/9/20**
3		1.1	Communication	784 days	3/8/17	3/9/20
4		1.2	Financial Management	784 days	3/8/17	3/9/20
5		1.3	Technical Management	784 days	3/8/17	3/9/20
6		**2.******	**Project Meetings**	**829 days**	**3/8/17**	**5/11/20**
7		2.1	Kick-off Meeting	1 day	3/15/17	3/15/17
8		2.2	Site Reconnaissance	3 days	4/18/17	4/20/17
9		**2.3**	**Steering Committee Meetings**	**721 days**	**5/2/17**	**2/4/20**
10			**Quarterly Steering Committee Conference Calls**	**721 days**	**5/2/17**	**2/4/20**
23		2.4	In-Person Meetings at SRP	784 days	3/8/17	3/9/20
24		2.5	End of Project Meeting at SRP	1 day	5/11/20	5/11/20
25		**3.******	**Data Compilation and Model Review**	**827 days**	**3/16/17**	**5/15/20**
26		3.1	Data Compilation	796 days	3/16/17	4/2/20
27		3.2	Data Management	796 days	3/16/17	4/2/20
28		3.3	Data Analysis	755 days	3/30/17	2/19/20
29		3.4	Existing Model Review	30 days	4/24/17	6/2/17
30		**3.5.1**	**Tech Memo (1 of 3) - Initial Data Compilation**	**45 days**	**6/29/17**	**8/30/17**
31			TM1 Draft	10 days	6/29/17	7/12/17
32			TM1 Committee Review	25 days	7/13/17	8/16/17
33			TM1 Final	10 days	8/17/17	8/30/17
34		**3.5.2**	**Tech Memo (2 of 3) - Leap Frog**	**45 days**	**10/12/17**	**12/13/17**
35			TM2 Draft	10 days	10/12/17	10/25/17
36			TM2 Committee Review	25 days	10/26/17	11/29/17
37			TM2 Final	10 days	11/30/17	12/13/17
38		**3.5.3**	**Tech Memo (3 of 3) - Final Data Compilation**	**45 days**	**3/16/20**	**5/15/20**
39			TM3 Draft	10 days	3/16/20	3/27/20
40			TM3 Committee Review	25 days	3/30/20	5/1/20
41			TM3 Final	10 days	5/4/20	5/15/20
42		**4.******	**Conceptual Model Development**	**225 days**	**3/30/17**	**2/7/18**
43		4.1	Review/Alterations of Existing CMs	140 days	3/30/17	10/11/17
44		4.2	Develop New CMs	140 days	3/30/17	10/11/17
45		4.3	Initial Water Budget	140 days	3/30/17	10/11/17
46		4.4	Assess Multiple CMs	140 days	3/30/17	10/11/17
47		**4.5**	**Technical Memoradum for CMs**	**50 days**	**11/30/17**	**2/7/18**
48			CM TM Draft	15 days	11/30/17	12/20/17
49			CM TM Committee Review	25 days	12/21/17	1/24/18
50			CM TM Final	10 days	1/25/18	2/7/18
51		**5.******	**Numerical Model Development**	**490 days**	**2/8/18**	**12/25/19**
52		5.1	Model Selection	15 days	2/8/18	2/28/18
53		5.2	Numerical Model Construction	100 days	3/1/18	7/18/18
54		**5.3.1**	**Technical Memoranda for Numerical Model Development Approach**	**50 days**	**3/29/18**	**6/6/18**
55			Model TM 1 Draft	15 days	3/29/18	4/18/18
56			Model TM 1 Committee Review	25 days	4/19/18	5/23/18
57			Model TM 1 Final	10 days	5/24/18	6/6/18
58		**5.3.2**	**Technical Memoranda for Numerical Model Development**	**50 days**	**7/19/18**	**9/26/18**

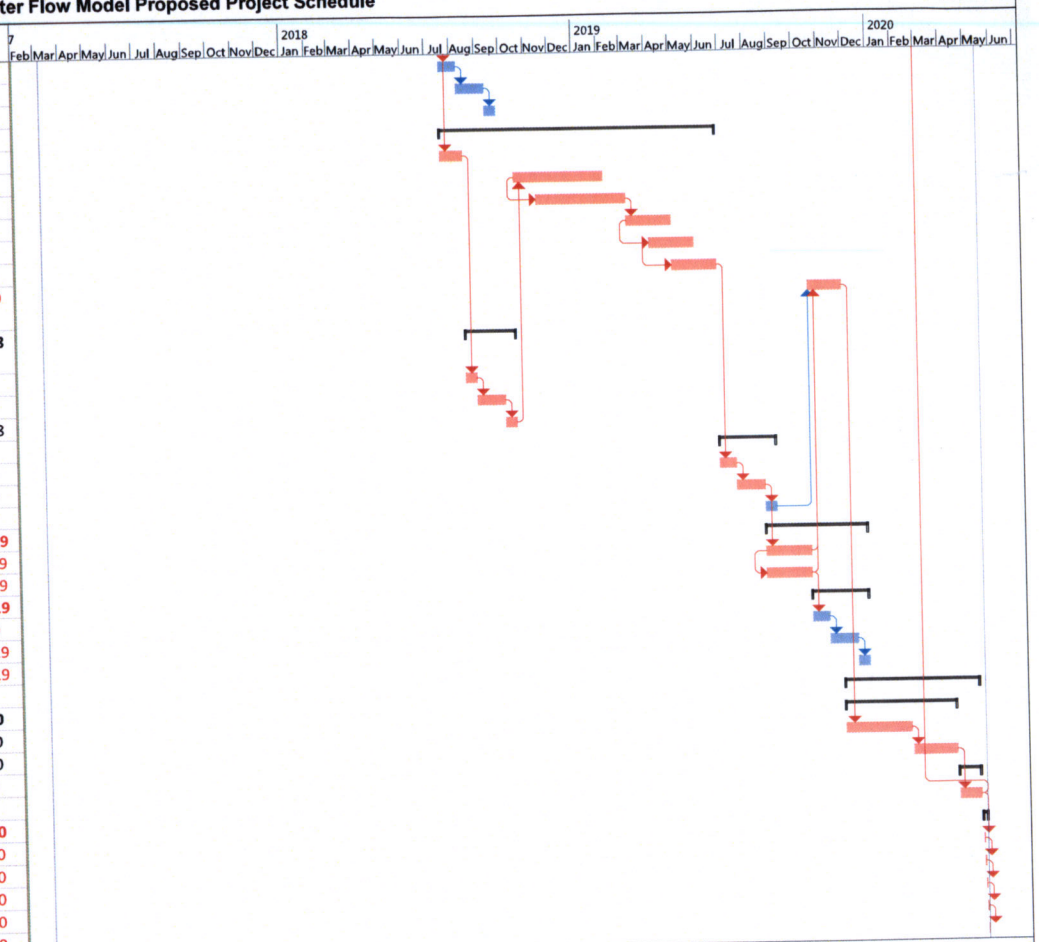


February 2017

Big Chino Sub-Basin Groundwater Flow Model Proposed Project Schedule

P1662614

ID	Task Mode	Text1	Task Name	Duration	Start	Finish
59			Model TM 2 Draft	15 days	7/19/18	8/8/18
60			Model TM 2 Committee Review	25 days	8/9/18	9/12/18
61			Model TM 2 Final	10 days	9/13/18	9/26/18
62		5.4	**Numerical Model Calibration**	**245 days**	**7/19/18**	**6/26/19**
63		5.4.1	Calibration Approach	20 days	7/19/18	8/15/18
64		5.4.2	Parameter Estimation (Calibration)	80 days	10/18/18	2/6/19
65		5.4.3	Incorporate Various CMs	80 days	11/15/18	3/6/19
66		5.4.4	Sensitivity Analyses	40 days	3/7/19	5/1/19
67		5.4.5	Evaluation of Groundwater Flow Paths	40 days	4/4/19	5/29/19
68		5.4.6	Uncertainty Analysis for flows to UVS	40 days	5/2/19	6/26/19
69		5.5	Refinement of CMs and Adjustment of Calibration (Optional)	30 days	10/17/19	11/27/19
70		5.6.1	**Technical Memoranda for Model Calibration Approach**	**45 days**	**8/16/18**	**10/17/18**
71			Model Cal Approach TM Draft	10 days	8/16/18	8/29/18
72			Model Cal Approach TM Committee Review	25 days	8/30/18	10/3/18
73			Model Cal Approach TM Final	10 days	10/4/18	10/17/18
74		5.6.2	**Technical Memoranda for Model Calibration**	**50 days**	**6/27/19**	**9/4/19**
75			Model Cal TM Draft	15 days	6/27/19	7/17/19
76			Model Cal TM Committee Review	25 days	7/18/19	8/21/19
77			Model Cal TM Final	10 days	8/22/19	9/4/19
78		5.7	**Stress Tests (Optional)**	**90 days**	**8/22/19**	**12/25/19**
79		5.7.1	Groundwater Pumping	40 days	8/22/19	10/16/19
80		5.7.2	Precipitation Variability	40 days	8/22/19	10/16/19
81		5.7.3	**Technical Memoranda for Stress Tests**	**50 days**	**10/17/19**	**12/25/19**
82			Stress Test TM Draft	15 days	10/17/19	11/6/19
83			Stress Test TM Committee Review	25 days	11/7/19	12/11/19
84			Stress Test TM Final	10 days	12/12/19	12/25/19
85		6.****	**Groundwater Model Report**	**120 days**	**11/25/19**	**5/8/20**
86		6.1	**Draft Report**	**100 days**	**11/25/19**	**4/10/20**
87			Draft Report	60 days	11/25/19	2/14/20
88			Draft Report Committee Review	40 days	2/17/20	4/10/20
89		6.2	**Final Report**	**20 days**	**4/13/20**	**5/8/20**
90			Final Report	20 days	4/13/20	5/8/20
91		7.****	**Training (Optional)**	**5 days**	**5/11/20**	**5/15/20**
92		7.1	Numerical Code	1 day	5/11/20	5/11/20
93		7.2	Leapfrog	1 day	5/12/20	5/12/20
94		7.3	Flow Source	1 day	5/13/20	5/13/20
95		7.4	Model Orientation	1 day	5/14/20	5/14/20
96		7.5	Database	1 day	5/15/20	5/15/20



CITY OF PRESCOTT
ARIZONA
Everybody's Hometown

REQUEST FOR STATEMENTS OF QUALIFICATIONS

HYDROGEOLOGIC MODELING SERVICES

for

Development of a
Big Chino Sub-basin Groundwater Flow Model

Public Works Department

Telephone: (928) 777-1130

Fax: (928) 771-5929

Due Date: September 22, 2016

REQUEST FOR STATEMENTS OF QUALIFICATIONS

Big Chino Sub-basin Groundwater Flow Model

The City of Prescott, Arizona, Town of Prescott Valley, Arizona, and Salt River Valley Water Users' Association and Salt River Project Agricultural Improvement District (SRP), collectively acting as the Comprehensive Agreement No. 1 (CA#1) Steering Committee, request submission of Statements of Qualifications (RSOQ) by hydrogeologic professionals/engineering firms to provide specified services. Statements must be received **before 2:00 PM on Thursday, September 22, 2016**, by the Prescott City Clerk's Office, 201 S. Cortez Street, Prescott, Arizona 86303, at which time all statements will be publicly opened.

Any statements received at or after 2:00 PM on the above stated date will be returned unopened. Statements must conform to this RSOQ and the attached Project Scoping Report. The City of Prescott in coordination with the CA#1 Parties reserves the right to reject any and all statements, and assumes no responsibility for the cost of preparing a response to this request.

Complete information packets are available for public inspection at the Prescott Public Works Department, 433 N. Virginia Street, Prescott, Arizona 86301 (Phone: (928) 777-1130; TDD: (928) 777-1100) or on the City's website at http://www.prescott-az.gov/business/bids/. Individual packets may be obtained free of charge on the City of Prescott's website or by non-refundable payment of $2.00 from Public Works.

A **mandatory** pre-submittal conference will be held in the Prescott Public Works conference room, at **10:00 AM on Wednesday, August 10, 2016**. This meeting will be made available to out-of-town firms through Skype or conference call by making prior arrangements with the project manager.

Candace Manibusan, Contract Specialist
Published: 2TC July 24 and July 31, 2016

A. Description of Work

The CA#1 Parties will be reviewing the statements of qualifications of firms for the purpose of entering into a contract for the following services:

Assembly and evaluation of significant historical geologic, hydrologic and engineering work that has been accomplished over the past several decades, along with ongoing data collection, in order to create a rational scientific basis for the development of a groundwater flow model to assist in sound water supply management. The groundwater flow model must have the capability of predicting past, present, and future impacts, if any, on Big Chino Sub-basin groundwater resources and the Upper Verde River Springs (UVS). Further, it must have the capability to inform a mitigation plan, if necessary.

B. Submittal

Sealed Statements of Qualifications will be accepted before 2:00 PM on Thursday, **September 22, 2016**, at the City Clerk's Office, 201 S. Cortez Street, Prescott, Arizona 86303, at which time all submittals will be publicly opened. Any submittals received at or after 2:00 PM on the above-stated date will be returned unopened.

Ten (10) copies of Statements shall be submitted, and must conform to the attached Project Scoping Report. The City of Prescott reserves the right to reject any and all statements and the City assumes no responsibility for the cost of preparing a response to this request.

The outside of the statement envelope shall indicate the name and address of the respondent, shall be addressed to the City Clerk, City of Prescott, at the above address, and shall be marked **Statement of Qualifications: Big Chino Sub-basin Groundwater Flow Model**

C. Format and Evaluation of Statements of Qualifications

C.1. Statements of Qualifications Format

The statement shall be limited to no more than ten (10) pages, and include the following:

- Location of the firm
- A statement of the submitting firm's understanding of the project purpose and scope, and a general overview of how the firm would approach, manage, and complete the project.
- Names of the team members proposed for the project
- A list of similar projects in which the team has participated, and contact information
- A brief resume of each of the team members describing their experience and background
- A summary of the current workload of key team members and list of their notable projects

- A list of all sub-consultants proposed to be utilized on the project and a description of their roles
- A tentative schedule for accomplishment of the project
- Identification of potential conflicts of interest such as:
  - Contract work for any of the parties to Comprehensive Agreement No. 1 (CA#1)
  -Involvement in any aspect of the Gila River Adjudication
  -Ongoing or anticipated work concerning the Verde River, UVS, or the Big Chino Sub-basin
- Description of procedures or methods that will be used to protect this project and the CA #1 Parties from any potential conflicts of interest identified above.

Five (5) additional pages of appendices are allowed, and may include graphs, charts, photos, or additional resumes. The letter of transmittal shall not exceed two pages, and will not be counted in the ten (10) page limitation for the Statement of Qualifications.

C.2. EVALUATION

Statements of Qualifications will be evaluated by the Project Review Committee appointed by the CA#1 Steering Committee according to the following criteria, with weighting as indicated:

1) Specific experience of the firm with comparable groundwater flow models in groundwater basins/sub-basins within the State of Arizona or other states - 20%

2) Knowledge and experience with local / regional conditions (or similar) including subsurface and geophysical conditions - 25%

3) Experience and performance of the proposed project team and availability, within current and anticipated workload, for this project - 15%

4) Proposed project approach, to include a detailed discussion and identification of areas that will require special attention - 35%

5) Overall quality of the Statement evidencing interest in the project - 5%

D. SHORTLIST AND INTERVIEWS

Following evaluation of the Statements of Qualifications, a shortlist of up to five responding firms will be determined based upon the composite of Project Review Committee member scores. A presentation-interview session with each of the shortlisted firms will comprise the second half of the evaluation/selection process, if deemed necessary by the Committee. In the presentation-interviews, candidate firms will be required to demonstrate their understanding and familiarity with the scope, location, and other aspects of this project. The Committee will have the opportunity to pose questions regarding the submittal of each firm

and their presentation at that time. Criteria and weighting for evaluation of the shortlist presentation-interviews are as follows:

1) Observation of existing conditions and grasp of key project information - 30%

2) Identification of issues or problems (solutions) that will need to be considered - 30%

3) Approach to project reports, information gathering and analysis, report formatting, including innovative ideas - 40%

The Committee reserves the right to proceed to Final Ranking based on the Statements of Qualifications submitted without conducting interviews.

E. Final Ranking and Contract Negotiation

Review Committee members will individually evaluate the initial submittals and presentation-interviews of each of the candidate firm(s), and rank them according to the aforementioned criteria. A final ranking of the firms will be accomplished by Committee consensus, after which each of the candidate firms will be notified of the final rankings. The top-ranked firm will be invited to commence contract negotiations. If negotiations are unsuccessful with the top-ranked firm, the City will terminate negotiation efforts and open negotiations with the 2nd ranked firm. This process will continue until negotiation of a contract is successful. The final list will remain in effect for a period of twelve months from the date of issuance by the City. The City reserves the right to reject all submittals and re-advertise the project should agreement not be reached on a contract.

Approval of the Prescott City Council will be required for award of a contract for performance of the services described herein.

F. Additional Information

Ben Burns, City of Prescott Capital Improvements Manager
Phone Number: 928-777-1602
Email: ben.burns@prescott-az.gov

CITY OF PRESCOTT
ARIZONA
Everybody's Hometown

Public Works Department

433 N. Virginia Street
Prescott AZ 86301
928-777-1130

Project Scoping Report
7/14/2016

Project Description

Project Name:	Big Chino Sub-basin Groundwater Flow Model (BCSM)
City Project Number:	CIP15-045
Project Type:	Water
City Project Account Number:	7122230
Funding Sources:	City of Prescott, Town of Prescott Valley, Salt River Valley Water Users' Association and Salt River Project Agricultural Improvement District (SRP)
Project Location Map:	Attachment A
Duration:	3 years

Project Team

Project Review Committee:

City of Prescott
Project Manager – Ben Burns
Water Resource Manager – Leslie Graser
Specialized Technical Consultant – Southwest Ground-water Consultants – A Division of Matrix New World (SGC)

Town of Prescott Valley
Water Resource Manager – John Munderloh
Specialized Technical Consultant – Southwest Ground-water Consultants – A Division of Matrix New World (SGC)

Salt River Project
Water Rights Manager – Greg Kornrumph
Specialized Technical Consultant – Leonard Rice Engineers, Inc. (LRE)

Goal

The project goal is timely accomplishment of the assembly and evaluation of significant historical geologic, hydrologic and engineering work that has taken place over the past several decades, along with ongoing data collection in order to create a rational scientific basis for the development of a groundwater flow model to assist in sound water supply management. The groundwater flow model must be capable of predicting past, present and future pumping impacts, if any, on groundwater resources in the Big Chino Sub-basin and on the Upper Verde River Springs (UVS). Further, it must have the capability to inform a mitigation plan, if necessary.

Description of Work

This contract is to assimilate data sets, determine and outline proposed conceptual models, and construct a Big Chino sub-basin groundwater flow model. The Contractor shall perform the work in a manner consistent with the degree of care and skill ordinarily exercised by members of the same profession. The Contractor may suggest further model development considerations to the Parties to attain a better model. The Contractor should be fully aware that this contract is solely for model development, with the understanding that the model is intended to be used for mitigation planning, if necessary, and overall water management within the Big Chino Sub-basin. Such future uses are not and will not be part of this contract, rather to be addressed by future agreements as outlined in CA#1 (described below).

An extensive area of Northern Arizona, which included the Big Chino Sub-basin was modeled previously and documented in USGS Scientific Investigation Report 2010-5180. As this USGS project was nearing completion, alternative conceptual systems (ACS) were identified. These ACS's will require review and contractor opinion as to their viability along with recommendation to delete any that are not viable. These ACS will be provided during the mandatory pre-RSOQ meeting.

Project Description

Comprehensive Agreement No. 1 Parties

The City of Prescott (City), Town of Prescott Valley (Town), and Salt River Valley Water Users' Association, and Salt River Project Agricultural Improvement and Power District (SRP), collectively known as "the Parties" to Comprehensive Agreement No. 1 (CA#1), are soliciting Statements of Qualifications for the development of a groundwater flow model in accordance with CA#1. The primary purposes of CA#1 are to 1) implement an enhanced groundwater and

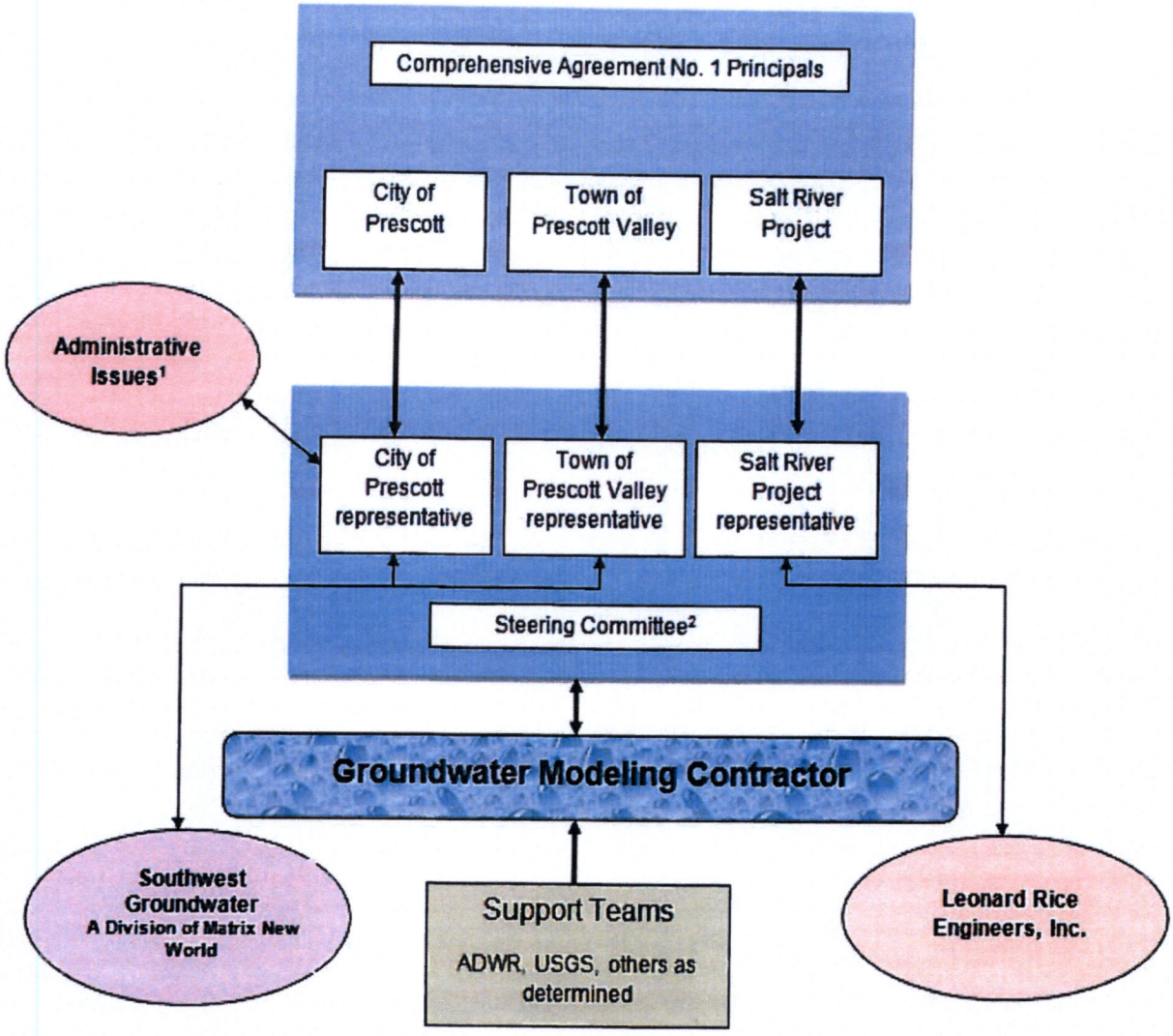
surface water monitoring system to generate data for 2) a Big Chino Sub-basin specific groundwater model.

Introduction/Background

In the arid Southwest, communities have engaged in water supply planning since statehood (1912), and in many cases earlier. The City of Prescott is no exception; it is a community dating back to territorial days (1864). The Town of Prescott Valley, a more recent community established in 1978, must meet the same state requirements as the City since both reside in the state-defined Prescott AMA. Water in the Southwest, notably in Arizona, can involve not just individual cities and towns, but regions (or in this case both basins and watersheds). In 1983, the City acquired a Colorado River water supply allocation, but in 1994, was sold with the understandings of compensatory groundwater supplies in the Big Chino Sub-basin (A.R.S. §45-555 (E)). In 1999, the Prescott AMA was declared to be out of safe-yield, and the City, in accordance with A.A.C. Title 12-15-7, completed the requirements to become a Designated Water Provider as documented in a Decision and Order (D&O) of Assured Water Supply No. 86-401501. Since that time, the D&O has remained in force, subject to ongoing careful management of water supplies. In 2004, the City and Town entered into an IGA to acquire lands in the Big Chino Sub-basin for the purpose of transporting water supplies into the AMA. Application was made for this supply (the result of relinquishing CAP supplies) to be included in the City's D&O; however, it was contested by SRP and other downstream users. Ultimately, a court decision was rendered in favor of the City, and the D&O was issued. The City meanwhile began engineering and right-of-way work for various facilities to pump, store and transport Big Chino water into the Prescott AMA. In 2009, the three parties began negotiations to settle differences. The result was the Agreement in Principle (AIP) dated February 2010. The AIP set forth principles guiding the parties and forming the basis for more detailed future agreements addressing specific items including groundwater modeling, groundwater and surface water monitoring, and mitigation, if necessary associated with future pumping from the City's Big Chino Water Ranch and importation of water into the Prescott AMA. The AIP was followed by Comprehensive Agreement No. 1 (CA#1) dated October 2012, an agreement addressing monitoring and modeling in the Big Chino Sub-Basin, with the addition of mutual recognition of certain water rights arising from the Prescott AMA. This scope of work is intended to fulfill the requirements as outlined in CA#1 for the development of a groundwater flow model to improve the understandings of the groundwater system and use as a tool to evaluate mitigation alternatives, if necessary. A successful applicant will be able to contrast their experience and success working in geologically complex environments similar to the Big Chino Sub-basin.

Approach

This modeling effort is based upon the aforementioned agreements among the City, Town and SRP, and is funded by all three parties. Each entity has its own Council or Board that guides policy and makes final decision on contracts and expenditures. Each entity in accordance with the CA#1 has designated one person to represent its organization and work cooperatively with ADWR and USGS to oversee development and implementation of the Big Chino Sub-basin Groundwater Flow Model (BCSM). The City is the fiduciary agent. The project organization is shown below.



[1]Issues related to contracts, payments, and other administration.
[2]Includes Big Chino Monitoring Committee and Big Chino Modeling Committee.

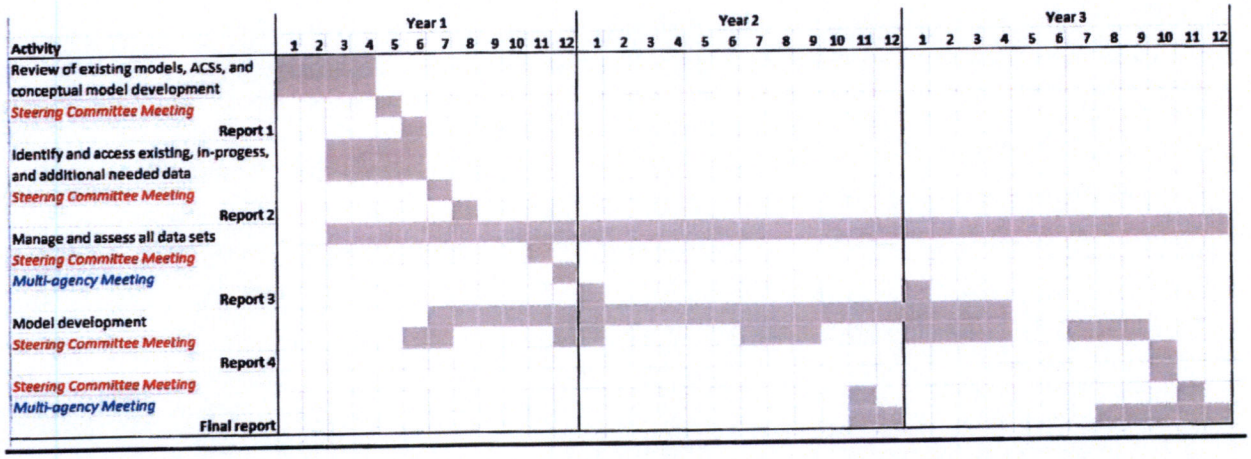
Clear communication pathways must be established and maintained throughout this project. Items related to the contract, payments, and other administrative matters will be directed to the City. All technical issues will be addressed to the Big Chino Monitoring and Modeling Committees (Steering Committee) as a whole. No technical discussions with individual Steering Committee members or Support Teams shall be undertaken unless cleared by the full Steering Committee. Communications from specialized technical consultants (LRE and SGC) should come through the pertinent Steering Committee member, unless otherwise designated by the full Steering Committee. The Steering Committee will meet regularly throughout the contract to address topics raised by the Groundwater Model Contractor. The Contractor should not contact members of the Steering Committee or Support Teams individually except for requests for specific data. This communication plan will assure full awareness by all members of the Steering Committee of all technical issues.

Associated Project Studies

The City of Prescott maintains a webpage related to the Big Chino Water Ranch and the AIP and CA#1 activities. http://www.prescott-az.gov/services/water/chino.php

General Schedule

A three-year period for the completion of a groundwater flow model has been identified by the CA#1 Steering Committee. Adherence to the schedule is necessary and will require efficiency at all levels and close collaboration. Respondents to this RSOQ must be willing to adjust workloads and tasks as needed to achieve the schedule below.



Deliverables

1. ***Project Kick-Off Meeting*** The Contractor will be required to attend a kick-off meeting with the CA#1 Steering Committee at a time and on a date convenient to both parties. At that meeting, the Contractor will be required to provide a detailed model schedule, a list of the team members who will be involved in the project, along with their phone numbers and e-mail addresses, an organization chart showing the relationship of all of the team members, and any submittals contractually required.

2. ***Model Schedule*** The Contractor shall submit a detailed schedule depicting all major tasks and primary submittal dates for approval by the CA#1 Steering Committee. Thereafter, the Contractor shall submit monthly project schedule updates in the same format and shall highlight and provide justification for any changes to the approved schedule. The Contractor shall include up to five (5) weeks of review time by the CA#1 Steering Committee (review and response actions per submittal) in the schedule.

3. ***Steering Committee Meetings*** The Contractor shall attend CA#1 Steering Committee meetings to discuss progress and technical issues as needed. The CA#1 meets monthly; however, it is anticipated that meetings including the Contractor will occur every other month during model development.

4. ***Multi-Agency Meetings*** The Contractor will be required to attend multi-agency meetings. These will be arranged to correspond with the general schedule and several meeting will occur during model development.

5. ***In-progress Data Collection*** The Contractor will need to assess and report on existing, in-progress and forthcoming data collection (see General Schedule). In-progress data collection includes ephemeral stream flow, precipitation, groundwater monitoring, geophysical and geochemistry. The Contractor may recommend collection of additional data sets necessary to assess the ASC's.

6. ***Monthly Progress Reports*** In addition to those meetings indicated above, the Contractor shall prepare and submit to the CA#1 Steering Committee a project status briefing that outlines and discusses pertinent issues.

7. ***Benchmarks*** The Contractor will be responsible for providing a work plan that sets target dates for the project.

8. ***Provision of Post-Model Construction Consultation Services*** The Contractor will provide technical assistance as needed to the CA#1 Steering Committee's specialized technical representatives as needed post-model development. The Contractor may be retained to provide ongoing support on the model subject to additional comprehensive agreements that may be in place as the model contract approaches conclusion.

9. ***Meeting Minutes*** The Contractor shall be responsible for recording and preparing accurate minutes from all meetings involved with the project. A hard copy and disk of the minutes shall be submitted to the City's Water Resource Manager (Leslie Graser). The disk must in Microsoft Word format.

RSOQ Milestones

Milestone	Tentative Date
Advertise Requests for Statements of Qualifications	July 24, 2016 and July 31, 2016
Pre-RSOQ Conference	August 10, 2016
Additional Information Requests Due	August 22, 2016
Responses to Questions	August 25, 2016
Addenda to RSOQ (if needed)	September 8, 2016
Statements of Qualifications Due	September 22, 2016
Short-List for Interviews	October 7, 2016
Award contract	February 2017

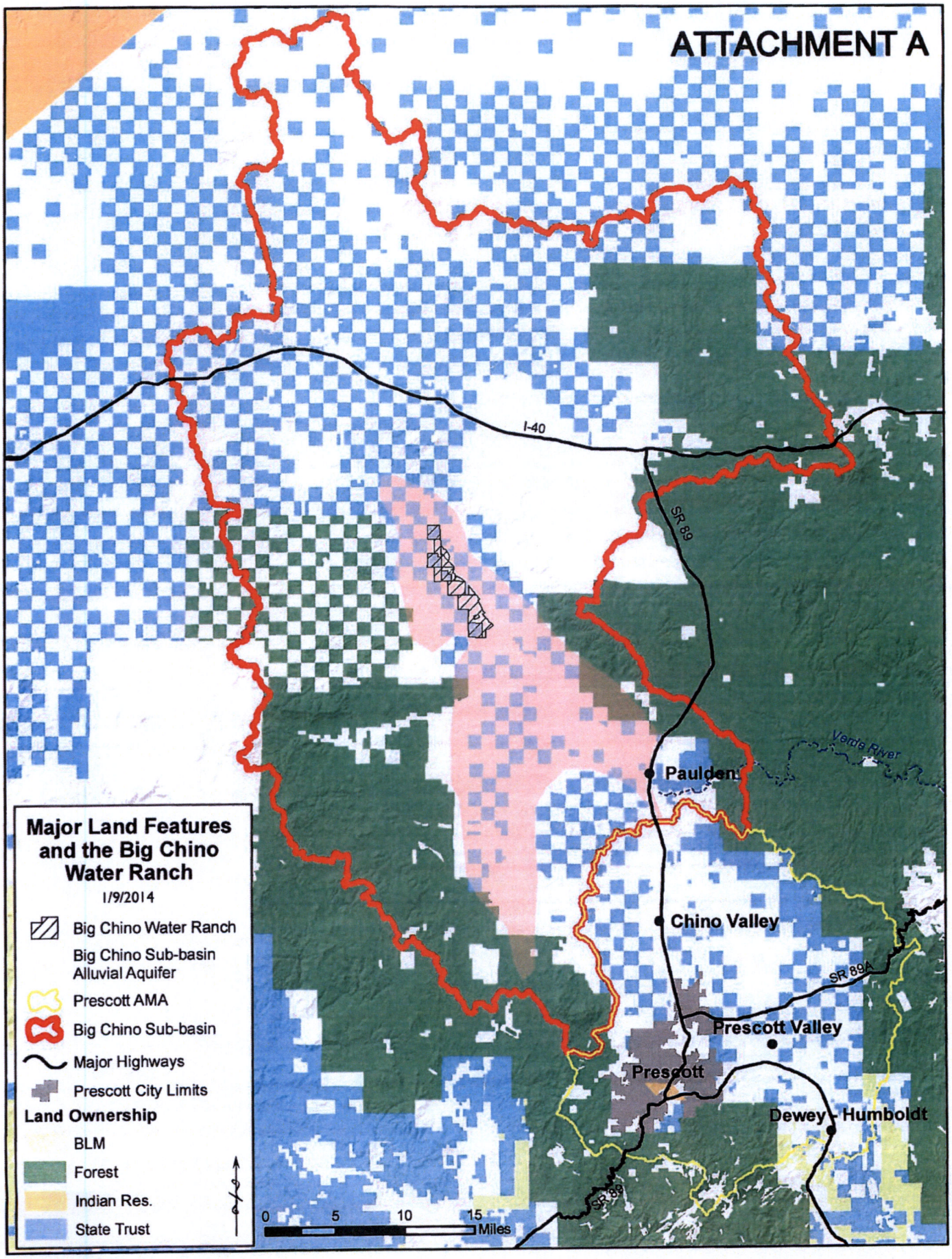
Approvals

Public Works Program Manager _____ Date 7/15/16
Steve Orosz

Water Resource Manager _____ Date 7/15/16
Leslie Graser (City CA1 representative)

Public Works Dir. _____ Date 7/18/16
Henry Hash

City Manager _____ Date 7-15-16
Craig McConnell


ATTACHMENT A
I-40
SR 89
Verde River
Paulden
Chino Valley
SR 89A
Prescott Valley
Prescott
Dewey - Humboldt
SR 89
Major Land Features and the Big Chino Water Ranch
1/9/2014
Big Chino Water Ranch
Big Chino Sub-basin Alluvial Aquifer
Prescott AMA
Big Chino Sub-basin
Major Highways
Prescott City Limits
Land Ownership
BLM
Forest
Indian Res.
State Trust
0 5 10 15 Miles

CERTIFICATE OF LIABILITY INSURANCE

5/1/2018

DATE (MM/DD/YYYY) 4/12/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Lockton Companies 444 W. 47th Street, Suite 900 Kansas City MO 64112-1906 (816) 960-9000	CONTACT NAME: PHONE (A/C, No, Ext): FAX (A/C, No): E-MAIL ADDRESS:
INSURED 1404899 GOLDER ASSOCIATES INC. 3801 PGA Boulevard Suite 603 Palm Beach Gardens FL 33410	INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A : Zurich American Insurance Company — 16535 INSURER B : Steadfast Insurance Company — 26387 INSURER C : INSURER D : INSURER E : INSURER F :

COVERAGES PARENT **CERTIFICATE NUMBER:** 14556235 **REVISION NUMBER:** XXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC OTHER:	Y	N	GLO5393921	5/1/2017	5/1/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG $	$ 2,000,000 $ 2,000,000 $ 5,000 $ 2,000,000 $ 4,000,000 $ 4,000,000 $
A	AUTOMOBILE LIABILITY X ANY AUTO X OWNED AUTOS ONLY [ ] SCHEDULED AUTOS X HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY	N	N	BAP5393920	5/1/2017	5/1/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) $	$ 2,000,000 $ XXXXXXX $ XXXXXXX $ XXXXXXX $ XXXXXXX
	[ ] UMBRELLA LIAB [ ] OCCUR [ ] EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [ ] RETENTION $			NOT APPLICABLE			EACH OCCURRENCE AGGREGATE $	$ XXXXXXX $ XXXXXXX $
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N [N] If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	N	WC5393917	5/1/2017	5/1/2018	X PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 2,000,000 $ 2,000,000 $ 2,000,000
B	PROFESSIONAL LIABILITY	N	N	EEC5899096	5/1/2017	5/1/2018	$3,000,000 PER CLAIM $3,000,000 ANNUAL AGG	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
RE: RE: P1662614 – PRESCOTT/BIG CHINO GW MODEL/AZ – PRESCOTT, AZ. CONTRACT NO. 2017-246. SEE ATTACHED

CERTIFICATE HOLDER

14556235

CITY OF PRESCOTT
PUBLIC WORKS DEPARTMENT
433 N. VIRGINIA STREET
PRESCOTT AZ 86301

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Lauren Arnelle

CONTINUATION DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS (Use only if more space is required)

THE CITY OF PRESCOTT IS AN ADDITIONAL INSURED WITH RESPECT TO GENERAL LIABILITY, WITH RESPECT TO LIABILITY ARISING OUT OF THE ACTIVITIES PERFORMED BY, OR ON BEHALF OF GOLDER, AS REQUIRED BY WRITTEN CONTRACT. WAIVER OF SUBROGATION IN FAVOR OF THE CITY OF PRESCOTT APPLIES TO GENERAL LIABILITY, AS REQUIRED BY WRITTEN CONTRACT AND ALLOWED BY LAW. GENERAL LIABILITY INCLUDES XCU. GENERAL LIABILITY INCLUDES CONTRACTUAL LIABILITY COVERAGE, SUBJECT TO POLICY TERMS, CONDITIONS AND EXCLUSIONS. CERTIFICATE HOLDER WILL RECEIVE 30 DAYS NOTICE OF CANCELLATION ON THE GENERAL LIABILITY, AUTO AND WORKERS COMPENSATION, EXCEPT 10 DAYS NOTICE WILL BE PROVIDED IN THE EVENT OF NONPAYMENT OF PREMIUM.