Grand County Stream Management Plan
Scope of Work, Phase 3B
Exhibit A

November 11, 2008
Revised February 11, 2009
Revised May 26, 2009
Revised May 28, 2009 (as noted)
Updated Nov. 4, 2009
Updated Feb 23, 2010 for CWCB

The purpose of this scope of work is to present the Phase 3 Technical Tasks for the Grand County Stream Management Plan (SMP). Five major tasks are included in Phase 3: 3.1) perform field-based stream assessment; 3.2) perform additional field assessments to complete the environmental flow analysis developed in Phase 2; 3.3) assessment of field data; 3.4) assess future flow regimes and compare to the recommended flows; and 3.5) identify potential restoration opportunities utilizing both flow-management techniques and physical-based approaches. These tasks are outlined in detail below. In addition two other tasks are presented including 3.6) plan implementation which is not included in this contract and 3.7) meetings and coordination. A cost spread sheet is attached as Exhibit B.

PROJECT SCHEDULE
Note that Tasks 3.1 and 3.2 were completed in 2008 and are presented in the task description for informational purposes but not included in the cost spread sheet. Tasks 3.3, 3.4, 3.5 and 3.7 were partially completed in 2009 and the remaining tasks will be completed in 2010. The attached cost spread sheet includes a breakdown of the portion of associated costs to be paid for through the Colorado Water Conservation Board's Colorado Basin Roundtable Water Supply Reserve Account Grant for $100,000.

As with previous Phases, the Tetra Tech project team includes HabiTech, Inc. and Walsh Aquatic Consultants, Inc.

For the purpose of this scope of work the following terms are utilized:

E**nvironmental flows:** flow regime refers to those flows that are determined to best maintain the ecological needs of the stream in relation to its fisheries. Included in these regimes are timing, frequency and quantity of stream flows.
Water users' flow requirements: estimates of flow requirements that optimize uses of irrigators, municipalities and industry, and/or recreation use.
Recommended flows: estimates of flow that optimize conditions for a given reach and specific use.

3.1 Stream Assessments

3.1.1 The work outlined in Task 3.1.1 is included in the Phase 3 Scope of Work currently under contract with Grand County

Conduct Stream Assessment: The goal of this stream assessment is to qualitatively evaluate the general, existing morphological and biological conditions of the project study reach. The approach for the assessment will involve field reconnaissance, and review of existing available information including maps and aerial photographs. Field reconnaissance will include assessment of the project reaches utilizing the following methodologies:

- **Channel stability evaluation:** Pfankuch, D.J. 1975. Stream reach inventory and channel stability evaluation: A watershed management procedure. U.S. Department of Agriculture, Forest Service. R1-75-002.

- **Mobile fraction of riffles:** Kappesser, Gary B. 2002. A Riffle Stability Index to Evaluate Sediment Loading to Streams. Journal of the American Water Resources Association, vol. 38, Issue 4, p.1069-1081

- **Habitat Quality Assessment, Visual Based Procedure, modified for the Grand County SMP:** Modified of EPA Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Habitat Assessment and Physiochemical Parameters (Second Edition, 1999). Available online at http://www.epa.gov/owow/monitoring/rbp/index.html
For the purpose of this scope of work it is assumed that the ten priority reaches (totaling 60 miles) will be included, requiring approximately three weeks for field reconnaissance. The channel stability evaluation and habitat assessments will be performed once within each reach, in sections of the river that are 1) physically accessible and 2) representative of the project reach. The habitat assessment will be limited to 100 feet each side of the banks and modified to include fish passage barriers. The riffle stability index evaluation will be conducted once at each of the PHABSIM sites.

The following outlines the field work procedures.

1. Collect and review existing available information including maps and aerial photographs, groundwater reports, wetlands mapping.
2. Working with the County staff, develop routing for field work, identify preferred access points and reaches for visual observation
3. Coordinate with County on property owner notifications
4. Contact other agencies and organizations for anecdotal information on the priority reaches and to identify areas of existing possible degradation that warrants field observations. Note that this task is limited to office time to call agencies and organizations.
5. Investigate possible aerial reconnaissance.
6. Perform field reconnaissance where access can be obtained.
7. Assembly data, photographs and field notes.

3.2 ***Additional Assessments***: ***The work outlined in Task 3.2 is included in the Phase 3 Scope of Work currently under contract with Grand County:*** Concurrent with the efforts noted above, additional work is proposed to complete the environmental flow analysis developed in Phase 2. This includes the following tasks:
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3.2.1 Develop environmental flow recommendations for Fraser River F3 (downstream of USGS gage, two sites on Ranch Creek, and one site on the Colorado River in CR4 downstream of Windy Gap). This requires collection of physical habitat data, surveying of cross sections and determination of hydraulic data at three separate flows. In addition implement the Nature Conservancy's Indicators of Hydrologic Alteration (IHA) using existing long term USGS gage records. Optimum flow regimes will be developed considering the results of the

PHABSIM, IHA, and consideration of other aquatic-related factors. Flushing flow needs at each site will be investigated using the PHABSIM cross-sectional data, including substrate pebble counts, and appropriate sediment mobilization and transport models. The results will be documented following the format utilized in Phase 2.

3.2.2 Survey transects at Reeder Creek, Troublesome Creek and lower Blue River. Flushing flows and substrate information will be investigated.

3.2.3 Conduct trout spawning surveys (i.e. redd surveys) during the fall to identify important spawning bars for both rainbow and brown trout.

3.2.4 Work with the County to develop water and air temperature monitoring and flow monitoring recommendations for summer monitoring.

3.2.5 Work with the County to develop recommendations for new permanent USGS gage sites.

3.2.6 Collect available fish counts and biomass data and add to reach by reach summaries.

3.2.7 Assemble data.

3.3 ***Assessment of Field Data.***

3.3.1 Prepare tables, figures, photos of 2008 field data and stream assessments.

3.3.2 Verify spawning habitat suitability curves from previous analysis with 2008 redd data and field surveys.

3.3.3 Compile PHABSIM analysis results for 4 new cross sections. Run analyses for single study sites (Blue, Reeder and Troublesome) including flushing flows.

3.3.4 Review flushing flow recommendations from Phase 2 and compare to this year's field assessment (riffle stability index analysis and redd particle size data).

3.3.5 Review and finalize all flow-habitat relationships at all study sites.

3.3.6 Compile 2008 data and incorporate into the Stream Management Plan

3.4 ***Assessment of Flow Regimes.*** For the purpose of this proposal the following analysis pertains to the 14 reaches with PHABSIM study sites developed in Phases 2 and 3a. These reaches are referred to below as 'study reaches'. This evaluation is to assess what approach (flow versus restoration) has the greatest potential to influence the situation that is protective of the future stream conditions and flow needs.

3.4.1 Future Conditions Flow Regimes: Tetra Tech shall conduct a time series analysis for future flow conditions with and without the proposed mitigation measures as outlined below. The hydrographs for dry, normal and wet years shall be supplied by Denver Water and Northern

Water Conservancy District and reflect future conditions as impacted by both the Moffat Tunnel and Windy Gap firming projects. Specific tasks are outlined below.

3.4.1.1 Perform time series analysis for the three years (dry, normal and wet years) and identify flow limitations relative to recommended flows from Phase 2 and 3a.
3.4.1.2 Develop appropriate tables and figures summarizing and comparing results of available habitat for different life stages and species for current conditions.
3.4.1.3 Identify key habitat differences between the flow scenarios and conditions.
3.4.1.4 Identify reaches where recommended flows may not be fully achieved and may be better addressed with restoration. Prepare a technical memorandum to summarize the analyses.

3.4 ***Restoration Opportunities*** For the purpose of this proposal the following analysis pertains to the 14 reaches with PHABSIM study sites developed in Phases 2 and 3a. These reaches are referred to below as 'study reaches'.

3.5.1 *Integrate Stream Assessment with Environmental Flow Recommendations.* The goal of this task is to integrate the stream assessment findings for the study reaches with environmental flow recommendations and identify reaches that appear stressed under existing conditions, and could be stressed under future altered conditions. This task includes using existing habitat-flow relations and PHABSIM sites to the extent possible, to assess the trade-offs between physical restoration versus enhancement of stream flows for improving stream health.

A stream matrix and ranking system is proposed. Based on the matrix and professional judgment begin to prioritize reaches for different types of management strategies such as flow enhancement, and/or physical restoration. Specific tasks are outlined below.

3.5.1.1 Develop stream reach matrix based on field-based assessment and rank the reaches based on field-derived analyses. This matrix will include problems and/or issues identified in the field from the work performed in Phases 2 and 3a.
3.5.1.2 Incorporate flow regime (Section 3.4) analysis into matrix, identifying streams with the smallest to largest flow deviation from recommended flows.
3.5.1.3 Add fish density and biomass data.
3.5.1.4 Incorporate other findings from Phase 2 and 3a into the stream reach matrix including temperature deviations from guidelines, deviations from water user needs and recreational flows, fish and boater passage barriers, fish disease, etc. Develop and implement a procedure to reconcile the differences in flows for different uses and select a priority use and target flow regime(s). Identify restoration goals for those reaches identified as suitable for restoration.
3.5.1.5 Incorporate updates to the recreational flows from the American Whitewater study.
3.5.1.6 Review available work by others as it relates to flow modifications and possible impact to the Stream Management Plan.
3.5.1.7 Utilizing the results from the matrix and ranking system, and restoration goals, identify stream segments suitable for possible restoration, achieved either by flow management techniques or physical restoration, or a combination of both.
3.5.1.8 Prepare a technical memorandum to summarize the results of this task.

3.5.2 *Physical Restoration Opportunities*: Identify opportunities, limiting factors and suitability of reaches, on a conceptual basis, for physical restoration. This task will consider issues such as: What are the design flows? What are the restoration goals for the stream segment? What restoration activities might be considered to improve habitat and/or conditions for water users that might reduce or alter the recommended flows developed for each reach? What additional steps are required to design and implement restoration? The results will be documented including written descriptions, photographs and mapping as required describing the assessment and decisions. This task does not include numerical modeling, design or cost estimates for implementation. Specific tasks are outlined as follows:

3.5.2.1 Develop conceptual design elements for physical restoration including, but not limited to:

a. Channel narrowing, deepening, substrate modification, cover enhancement, and bank stabilization,
b. Fish passage improvements,
c. Flow by-pass structures,
d. Headgate improvements, and
e. Pump intake improvements

3.5.2.2 Identify locations for restoration within the study reaches and prepare recommendations (additional steps) for restoration design.

3.5.2.3 Prepare plans depicting locations of improvements. These plans will depict locations of design elements only. No detailed design or analysis is included.

3.5.2.4 Submit to County for review; revise and finalize based on County input.

3.6 ***Plan Implementation:*** It is recognized that ultimately the Stream Management Plan requires the development of an implementation plan and the formation of a Users Group to oversee and monitor the plan. This will require additional input to the Stream Management Plan including lines of communication and procedures on decision making, the development of written operational guidelines of reservoirs, timing of diversions, protocol for guidelines under drought and flood conditions, etc. These services are not included in this scope and fee estimate. However, following the completion of task 3.5 this work, or portions of this work, can be scoped and added.

3.7 ***Meetings and Coordination:*** For the purpose of this proposal and fee estimate a total of six (6) meeting are included in the total fee structure. Three will be attended by the entire project team and three only by the project manager. In addition, meeting costs are provided, in the cost estimate, on a per-meeting cost. All meetings are assumed to be held in Grand County, Denver, or Berthoud Colorado, or somewhere in between such that it will require all day to travel and attend, but no overnight lodging will be required. This task includes time for ongoing coordination, via telephone and email, with the County, stakeholders, steering committee, local water users and other local, State and Federal agencies throughout the implementation of Phase 3B.

COST ESTIMATE

A detailed cost estimate for Phase 3B is attached. Individual tasks are for budgeting purposes only. Fees for services shall be based on the overall project budget, i.e., a "Not to Exceed" amount, not on individual task budgets. Meeting and Coordination tasks are estimates only. Actual time required will be invoiced. Actual Costs for prints, plans, mileage, etc. will be invoiced on a cost plus 10% basis.

The cost estimate also includes fees for additional meetings, which would be added as requested by the County. Costs for additional meetings are estimates only. Actual time required will be invoiced.

The cost of the project is estimated at $233,669.00 of which $133,669 will be paid by Grand County and other partners and $100,000 will be paid by the Colorado Basin Roundtable Water Supply Reserve Account grant through the Colorado Water Conservation Board in the amount of $100,000.

QUALIFICATION OF SERVICES

This section presents specific work items that are *not* part of the proposed Scope of Work. Performance of these tasks could be executed at the request of the County. Additional services will be invoiced on an hourly basis in conjunction with our current Fee Schedule.

1) Additional flow scenarios other than described in Section 3.4
2) Participation in stakeholders work group except as outlined in Section 3.7
3) Wetland delineations and mitigation design
4) ~~Revisions to work tasks as a result of review and input from Denver Water and Northern Water Conservancy District~~
5) Permitting
6) Floodplain mapping for FEMA submittals
7) Construction documents
8) Public meetings
9) Groundwater drainage analysis
10) Geotechnical and structural analyses

COLORADO WATER CONSERVATION BOARD WSRA GRANT REQUIREMENTS

Payment: Payment will be made based on actual expenditures and invoicing by the water activity sponsor (Grand County). The request for payment must include a description of the work accomplished by major task, and estimate of the percent completion for individual tasks and the entire water activity in relation to the percentage of budget spent, identification of any major issues and proposed or implemented corrective actions. The last 5 percent of the entire water activity budget will be withheld until final project/water activity documentation is completed.

Reporting: Grand County shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the scope of work including a description of any major issues that have occurred and any corrective action taken to address these issues. TetraTech will provide Grand County with these reports to be forwarded to CWCB.

All products, data and information developed as a result of this grant must be provided to CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to Basin Roundtables and the general public and will help promote the development of a common technical platform.

In accordance with the revised WSRA Criteria and Guidelines, staff would like to highlight additional reporting and final deliverable requirements. The specific requirements are provided below.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

Engineering: All engineering work (as defined in the Engineers Practice Act (§12-25-102(10) C.R.S.)) performed under this grant shall be performed or certified by a professional engineer licensed by the State of Colorado to practice Engineering.

Budget:

TASK	DESCRIPTION	TOTAL PROJECT	CWCB PORTION
	Rates		
Task 3.3	**Assessment of Field Data**		
3.3.1	Prepare figures, tables, photos	$7,840.00	$2,840.00
3.3.2	Verify spawning habitat suitability curves with 2008 field data	$2,514.00	$0.00
3.3.3	Compile PHABSIM analysis; run single cross section analysis	$4,382.00	$882.00
3.3.4	Review flushing flows with field assessment	$2,976.00	$0.00
3.3.5	Finalize flow-habitat relationships	$4,414.00	$1,414.00
3.3.6	Update SMP	$10,438.00	$9,938.00
Task 3.4	**Assessment of Flow Regimes**		
3.4.1	Flow regimes analysis	$0.00	$0.00
3.4.1.1	Time series analysis	$16,180.00	$0.00
3.4.1.2	Compare available habitat	$7,370.00	$0.00
3.4.1.3	Summarize differences	$4,505.00	$1,005.00
3.4.2	Future flow regimes analysis	$1,510.00	$0.00
3.4.2.1	Time series analysis	$14,030.00	$3,030.00
3.4.2.2	Compare available habitat	$7,370.00	$1,370.00
3.4.2.3	Summarize differences	$3,945.00	$3,945.00
3.4.2.4	Assess approach: restoration vs flow modifications	$15,198.00	$5,198.00
Task 3.5	**Restoration Opportunities**		
3.5.1	Integrate stream assessment with environmental flow recommendations		
3.5.1.1	Field-based matrix	$7,060.00	$5,060.00
3.5.1.2	Flow regime ranking	$5,884.00	$3,884.00
3.5.1.3	Fish density and biomass data	$2,768.00	$2,768.00
3.5.1.4	Combine previous results	$6,162.00	$3,162.00
3.5.1.5	Update recreational flows (American Whitewater)	$3,080.00	$3,080.00
3.5.1.6	Review other work	$5,310.00	$3,010.00
3.5.1.7	Identify reaches for restoration	$6,168.00	$3,168.00
3.5.1.8	Technical memorandum	$13,120.00	$10,620.00
3.5.2	Physical Restoration Opportunities		
3.5.2.1	Conceptual Design Elements	$15,118.00	$10,118.00
3.5.2.2	Restoration locations/projects	$8,560.00	$5,688.00
3.5.2.3	Conceptual Plans-draft	$16,560.00	$13,060.00
3.5.2.4	Conceptual Plans-finalize	$6,760.00	$6,760.00
Task 3.6	**Plan Implementation and Enforcement-NIC**	$0.00	$0.00
Task 3.7	**Meetings and Coordination**	$34,447.00	$0.00
TOTAL		$233,669.00	**$100,000.00**
CWCB Portion of project are tasks that will be completed after contact is signed, March 2010.			