

ARCHITECTURAL & ENGINEERING CONTRACTS TASK ORDER

Public Draft Habitat Conservation Plan/Natural Community Conservation Plan

TASK ORDER NO. ICF-11 and Amendment 1

Contractor: ICF Jones & Stokes, Inc.

Request for Services under Standard Agreement No. 4600008897

Dated: October 22, 2012; December 2012

DESCRIPTION OF TASK:

This Task Order provides for activities related to measuring the benefits and costs of the Bay Delta Conservation Plan (BDCP). The proposed study takes a statewide perspective, and analyzes impacts to various groups whose welfare may be impacted by the Plan. These groups include farmers in the Delta region, commercial fishers, water utilities in the Delta, recreational interests, and the like. The study also assesses the non-market benefits from numerous changes in the Delta environment, including air emissions from construction, carbon sequestration resulting from habitat restoration, reduced soil erosion and flood risk, and creation of habitat for endangered species. The study will also review previous work on the construction and operating costs of the BDCP, as well as the economic benefits of the Plan to the water agencies around California receiving water supplies from the Delta. Tasks are being provided by ICF Jones & Stokes, Inc. (Contractor) and their subcontractor (The Brattle Group).

Amendment 1 extends the task order by three months to respond to comments from the Core Team and ensure the analysis is scoped and framed to address the needs of the Finance Working Group, DWR, US Bureau of Reclamation ("Reclamation"), National Marine Fisheries Services (NMFS), US Fish and Wildlife Service (USFWS), California Department of Fish and Game (DFG), and Delta agricultural.

Major Tasks include:

- Task 1.** Task Order Management
- Task 2.** Conduct Analysis
- Task 3.** Prepare Draft Technical Report
- Task 4.** Prepare Final Technical Report

The scope of services provided under this Task Order will meet a portion of the scope and services as identified in Contract No. 4600008897, Exhibit A:

- Task 8. Conduct Economic Analysis
 - Subtask 8.1 Prepare Implementation Cost Estimate for Proposed Conservation Strategy
 - Subtask 8.3 Implementation Cost Chapter of BDCP
- Task 9. Prepare Public Draft of BDCP Document

- Subtask 9.1.8 Prepare Appendices

SCOPE OF WORK

Task 1. Project Management

This includes management tasks such as communication with DWR, team schedule management, and monthly invoice and progress report preparation. Monthly invoices will be accompanied by a summary of progress and tasks performed during the invoice period.

Task 2. Conduct Analysis

This task involves the analysis to develop and refine the methods and complete the analysis to estimate the economic costs and benefits of BDCP. This task also includes compiling existing cost and economic benefit information from other sources into a common format and currency. Cost and benefit components that will be quantified are divided into three broad categories:

2.1. Construction and operating costs of proposed project,

2.2. Impacts to Delta-dependent economic activities, and

2.3. Non-market environmental impacts

For each category, cost/benefit components and their methods of analysis are described below.

2.1 Construction and Operating Costs of Proposed Project

The Brattle Group will summarize work previously done on the construction and operating costs of the BDCP. Cost elements include the costs of Conservation Measure 1 (CM1; water facility construction and operation), and restoration of terrestrial and aquatic habitat in the Delta, this includes total cost of habitat restoration and all conservation measures included in the BDCP. This analysis will reflect refinements in how the no action alternative (NAA) is framed for the purpose of this analysis in construction and operation costs. To facilitate cost-benefit comparison, future construction and operating costs will be discounted to present values using federally-approved discount rates that reflect current conditions in US debt markets.

2.2 Impacts to Delta-Dependent Economic Activities

Increased water supply reliability to south of Delta water agencies. The Brattle Group will summarize its previous DWR-sponsored research on the benefits of improved water supply reliability resulting from the BDCP. The Brattle Group's previous analysis includes benefits to urban and agricultural water agencies receiving water from both the state and federal projects.

The Brattle Group's urban water supply analysis was carried out with the Supply-Demand Balance Simulation Model (SDBSIM), developed by The Brattle Group and the Metropolitan Water District of Southern California (MWD). SDBSIM is a positional hydrology model that simulates storage operations and end-use shortages under historical conditions in California.

The economic loss functions used in SDBSIM to value urban water shortages are based on an econometric model of urban water demand in the SWP service area. The agricultural water supply analysis was carried out using the Statewide Agricultural Production model (SWAP) that is also being used in the impact analysis for the BDCP Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

Reduced seismic risks to state and federal projects. The isolated conveyance envisioned as part of the BDCP will potentially reduce seismic risks to Delta water exports to the San Joaquin Valley and Southern California. Using SDBSIM, the Brattle Group has previously assessed the economic value of reduced seismic risks to the SWP and CVP, considering the interplay between natural fluctuations in precipitation, storage conditions at the time of the earthquake, and the duration of the project outage following the seismic event. This section of the report will use the previously conducted assessment to summarize the present value of the economic benefits of reduced seismic risks to urban and agricultural water agencies.

Reduced salinity of Delta exports. The Brattle Group has already quantified the economic benefits of reductions in the salinity of Delta exports; this section of the report will present the conclusions of the research in terms that facilitate a comparison of aggregate benefits and costs of BDCP. The value of salinity reductions to urban water consumers are quantified using a model developed by MWD and the Bureau of Reclamation (Reclamation). The model considers both consumer tastes for less saline water, and the useful life of home appliances under saline water conditions.

Impacts to Delta agriculture. Changes in the salinity of surface water in the Delta may have negative impacts on Delta agriculture. Further, restoring aquatic and terrestrial habitat may require that some Delta farmland be converted to habitat. Both features of BDCP have the potential to cause losses to Delta farmers. BDCP implementation proposed to convert over 45,000 acres of cultivated land to non-cultivated uses (e.g., habitat restoration, water conveyance facility). However, BDCP proposes to also permanently preserve in agriculture use an equivalent amount to provide habitat value for crop-dependent species such as Swainson's hawk and sandhill crane. While in the short-term there may be a net loss of cultivated land, BDCP proposes to also substantially increase the protection of cropland in the Delta, ensuring that it will not be converted to other uses. This section of the report will consider the economic significance of these changes.

Researchers at The Brattle Group assisted the Delta Protection Council (DPC) with the development of an econometric model of Delta land allocation. The model was the foundation for major sections of the DPC's Economic Sustainability Plan authored by Dr. Jeff Michael of the University of the Pacific. The econometric model explains Delta crop choices as a function of fixed and time-varying effects, including weather conditions, soil types, and the salinity of irrigation water. The Brattle Group will take this accepted econometric model and use it to simulate crop choices in the face of the possible new salinity conditions prevailing after implementation of the Plan. These changes in the crop mix will then be used to calculate changes in producer surplus (i.e., farmer net income) that are the proper basis for benefit-cost comparison.

Increased salinity and urban water treatment in the west Delta. Although the BDCP may have the beneficial effect of decreasing salinity in some areas, salinity levels may increase in Suisun Marsh and the west Delta. For the agricultural sector, the impact of salinity on agricultural water quality can be measured as the value of changes in leaching requirement or the value of irrigation water needed to maintain root zone salt balance. Market data will be used to

determine the cost of this impact on a per-acre basis and how it can be applied to value a given level of increased salinity. The water quality impact analysis in the BDCP EIR/EIS will be used as the basis for the cost estimates. Data on water treatment costs will be used to estimate the increased costs of urban water treatment due to increased salinity.

Impacts to commercial fishing activities. BDCP has the potential to impact commercial fish stocks, particularly salmon. Market data on the value of commercial fish harvests will be used to monetize this potential change. A crucial component of this analysis will be a determination of the net value of the catch, and how this value may change due to the BDCP. The net value of the catch considers not only the market value of the catch, but also the associated costs. These costs include the impact of any limitations on entry that are placed on the industry in an attempt to preserve fish stocks and maintain harvesting at sustainable levels. Data from the BDCP effects analysis (Chapter 5) on the population-level changes in covered fish (salmonids) expected from BDCP will be used. The analysis of Essential Fish Habitat, which considers effects of BDCP on commercially important stocks in San Francisco Bay and the Pacific Ocean, will also be used.

Impacts to recreational activities in the Delta. As part of its earlier benefits analysis of BDCP, researchers at The Brattle Group quantified the economic value of changes in Delta recreation. The Brattle Group considered activities including fishing, hunting, hiking, birdwatching, camping, and boating. This section of the report will update and report the results of The Brattle Group's earlier research, incorporating more exact environmental data provided by the Contractor. The analysis will consider both the economic loss of some recreational opportunities (e.g., hunting on managed wetlands lost to restoration activities) and the economic gain of other recreational opportunities (e.g., new hiking, fishing, and boating opportunities from habitat restoration) identified in the Recreation and Socioeconomics chapters of the EIR/EIS.

Labor market impacts in the Delta region. The BDCP has the potential to cause large changes in employment in the Delta region, both positive and negative. Construction of the isolated conveyance facility may create large numbers of jobs during the decade-long construction period, many of which will occur in the Delta region. Similarly, implementation of other BDCP conservation measures such as restoration of habitat and the large monitoring program may also create jobs in the area of the Delta. However, conversion of farmland to habitat may reduce the number of farm jobs, meaning that the net impact of the BDCP on the labor market of the Delta region is uncertain, and may vary over time. This section of the report will summarize The Brattle Group's extensive research on the employment impacts of the BDCP, with updates from the Contractor based on the current BDCP implementation program.

Supplemental Analysis. Characterize other new parameters related to Delta-dependent economic analysis identified through feedback gathered at the January Finance Working Group meeting and additional input from DWR, Reclamation, NMFS, USFWS, DFG, and Delta agricultural interests. New parameters will be characterized to assess whether they should be included in the analysis and associated level of effort.

2.3 Non-market Environmental Impacts

In addition to the environmental impacts described above, the BDCP may also result in "non-market" environmental impacts, or impacts to ecosystem goods and services that have only indirect ties to market activity. In addition, some ecosystem goods and services generate "non-use" values, or values that do not involve any direct or indirect use, and thus have no ties to

market activity. The non-market environmental impacts of the BDCP that will be valued are briefly described below.

Construction emissions. Construction of the water conveyance facility and other BDCP components has the potential to have substantial emissions of pollutants such as ozone (O₃), particulate matter (PM₁₀), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and carbon monoxide (CO), as described in the Air Quality chapter of the BDCP EIR/EIS. The Contractor will summarize these analyses and monetize the impacts of air emissions on the environment and on human health according to the Human Health Risk Assessment in the EIR/EIS. Implementation of BDCP conservation measures may partly offset the environmental impact of these pollutants. For example, extensive riparian restoration (5,000 acres) will plant thousands of trees that have the ability to absorb these and other pollutants. The Brattle Group will consider the use of an Environmental Protection Agency (EPA) method of valuing in dollars per gram removed by urban trees and potentially apply it to the Delta system and a benefit transfer approach.

Reduced soil erosion. A valuable ecosystem function provided by natural areas is providing a buffer that reduces erosion and the flow of sediment into waterways. The benefit transfer method will be used to value the increase in this service resulting from the natural community restoration and protection conservation measures in BDCP. The Brattle Group will first conduct literature reviews to identify possible source data for a benefit transfer exercise to value reduced soil erosion and will continue searching the literature to ideally determine source data for the erosion control benefits provided by other types of land.

Water quality. Water quality improvements from filtering and purification is an important ecosystem service provided by natural areas such as wetlands and forests. Wetlands have been shown to remove nutrients from water and reduce bacteria levels in water. The benefit transfer method will be used to value the water filtration services provided by forested lands based on percent tree cover. The per acre value of water treatment provided by wetlands will be valued based on the cost for a waste water treatment plant to remove similar levels of nitrogen and phosphorus from water.

Reduced flood risk. An important ecosystem service provided by natural areas is disturbance avoidance, including reductions in the risk of floods due to the water storage capacity of wetlands. Initial reviews of the literature suggest that per-acre values estimated for flood control benefits can vary widely. In some cases, the per-acre value assigned to flood control benefits would vary greatly even within the same study. This literature will be reviewed in greater depth to determine the most appropriate source data for valuing flood control and the most appropriate approach to conducting a benefit transfer, given the chosen source data.

Habitat values and biodiversity. It is often difficult and somewhat speculative to estimate the economic value of habitat services or the contribution of endangered species to the economy. No attempt to value the benefits of increases in the covered species will be made, but defensible methods will be identified to estimate the value of habitat services due to the significant increase in habitat and habitat biological values that the BDCP may provide. A literature review will be conducted to identify source data for use in a benefit transfer exercise associated with the general provision of species habitat and an increase in the quantity and quality of natural communities in the plan area.

Greenhouse Gas Benefits

An initial analysis of land cover/use changes associated with tidal and riparian habitat restoration indicated that these program elements could have a beneficial impact on greenhouse gas (GHG) emissions in the California Delta. This task will quantify the change in the average annual greenhouse gas flux (range of values based on a limited review of available scientific literature) between baseline and project conditions. Alternatives will not be evaluated. This task will include a basic discussion of the methodology used and associated uncertainties as well as an overview of established mechanisms for creating and selling wetland based carbon offset credits.

Because the GHG flux in wetlands varies greatly in space and time and depends strongly on salinity, hydrology, temperature and other environmental factors, an assessment of the GHG consequences of land use change in the California Delta requires local, site specific measurements of GHG fluxes. A comprehensive field measurement campaign is beyond the scope and purpose of this work. Therefore, this work will rely on available scientific literature on the greenhouse gas flux (CO₂, CH₄ and N₂O) in the California Delta to establish a range of both positive and negative GHG flux values for various environments as available. This range will be used with existing project GIS data to estimate the possible range of the GHG sink/source for the pre-project condition and one post-project condition, i.e. two time snapshots. This analysis will utilize readily available data and standard Tier 1 or 2 methods as recommended by the Intergovernmental Panel on Climate Change (IPCC). It will not be a life cycle analysis of agriculture, land clearing or the construction of the wetlands and it will not provide annual GHG sources and sinks at a level commensurate with the purchase or sale of an offset project. This analysis will provide an order of magnitude analysis of the change in GHG flux that will result from implementation of the project and the potential costs or value of this change given current market mechanisms.

Supplemental Analysis.

Characterize other new parameters related to Delta-dependent economic analysis identified through feedback gathered at the January Finance Working Group meeting and additional input from DWR, Reclamation, NMFS, USFWS, DFG, and Delta agricultural interests. New parameters will be characterized to assess whether they should be included in the analysis and associated level of effort.

Deliverables: Work products from Task 2 will be incorporated into the Draft Technical Report (Task 3). There will be no interim deliverable.

Task 3. Prepare Draft Technical Report

Once the analysis is complete, a draft technical report will be prepared that describes the methods used, the results, and draws overall conclusions about the cost and economic benefit of BDCP. This final section will offer an opinion about whether benefits exceed costs from a statewide perspective, and over what time frame. The concluding section will also summarize the impacts in various regions of California, and to various interest groups.

The draft technical report will be submitted for review by the California Department of Water Resources (DWR), Reclamation, and the water contractors involved in the BDCP.

Deliverables: Draft technical report in electronic format (pdf) and Word file for editing.

Task 4. Prepare Final Technical Report

Based on comments received on the draft, the Contractor and Brattle Group will revise the technical report and prepare a final report suitable for public distribution and web posting. If desired, the technical report may also accompany the BDCP, EIR/EIS, or both documents, as a technical appendix.

Deliverables: Final technical report in electronic format (pdf).

Task 5. Meetings and Coordination

Contractor will meet with other BDCP technical consultants, the BDCP Finance Working Group, DWR, Reclamation, NMFS, USFWS, DFG, and Delta agricultural groups to ensure appropriate project direction and discuss and gather feedback to frame and scope the cost-benefit analysis to satisfy the needs of these groups. Framing the analysis will involve refining and expanding how the NAA is characterized and expanded for the purpose of the cost-benefit analysis.

Specific meetings and coordination are as follows:

- A. Three presentations and meetings with the BDCP Finance Working Group, which is a public meeting.
 - a. January 2013: provide input on the parameters we are evaluating in the study.
 - b. March or early April: input on draft cost-benefit analysis.
 - c. May or June: input on final cost-benefit analysis.
- B. Follow-up and coordination with Delta Agriculture, NMFS, USFWS, DFG, Public Water Agencies, --Reclamation and DWR to ensure that the analysis meets the needs and expectations of these groups. This will likely include emails, conference calls and up to 3 in-person meetings.
- C. Conduct briefings on study findings to various groups, including Public Water Agencies, environmental NGOs, Delta agricultural groups, fishing associations, and others. Present findings to interested legislators and other state officials, as needed.

SCHEDULE AND DELIVERABLES*:

Contractor will be prepared to begin work upon approval of Task Order ICF-011 by DWR. This Task Order shall not extend beyond March 31, 2013. The deliverables for this Task Order are detailed below:

ICF-11 Deliverables	
Item	Due Date
Task 1. Monthly invoices and progress reports	Monthly for the duration of the task order
Task 2. Conduct Analysis	11 weeks from date of signed task order
Task 3. Prepare Draft Technical Report	17 weeks from date of signed task order
Task 4. Prepare Final Technical Report	week of May 15

DETAILED COSTS*:

Contractor shall invoice all services according to Exhibit B, including attachments, of Contract 4600008897. The total amount of this Task Order and Amendment One is \$336,044.78.

***NOTE:**

Should Contractor anticipate that additional money or additional time is needed to complete this Task Order, the Contractor shall notify the DWR Contract Manager in writing at least 20 business days prior to the depletion of funds or expiration of this Task Order in order to begin an amendment to this Task Order. No further services are to be provided from the time funds are depleted until the Task Order Amendment has been approved. In addition, no services shall be performed after the expiration date.

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AUTHORIZED SIGNATURES:

Contractor and State agree that these services will be performed in accordance with the terms and conditions of Standard Agreement Number 4600008897.

STATE OF CALIFORNIA
Department of Water Resources

ICF Jones & Stokes, Inc.

Dean F. Messer, Chief
Division of Environmental Services

David Zippin
Vice President

Date

Date