

**STATEMENT OF WORK**  
**CALFED DELTA LEVEE**  
**RISK MANAGEMENT ANALYSIS**

**Part I General Information**

**A. Introduction**

Many CALFED agencies and stakeholders have voiced concern over the need to assess the risks of Delta levee failure, to quantify the resulting consequences of failure, and to develop and implement an appropriate Risk Management Strategy (RMS).

A key management decision will be made at the end of Stage 1 Implementation as to the effectiveness of the CALFED Preferred Alternative. The following key levee related question must be answered at the end of Stage 1: "Are the risks to export water supply from levee failure acceptable, or are other actions required?" CALFED will develop and implement an appropriate RMS during Stage 1 to address these needs.

This Statement of Work (SOW) outlines the steps necessary to conduct a phased Risk Management Analysis (RMA) for the CALFED Levee Program. The goal of the RMA is to develop a RMS, or a prioritized list of actions, that can be implemented to mitigate the risks and/or consequences of Delta levee failure.

The Contractor shall perform a phased RMA that will assess risks, quantify resulting consequences, and formulate a RMS to manage those risks. The Contractor's efforts will include forming and managing a Levee Risk Assessment Team, research to obtain existing data, analyses, report preparation, participation in meetings, and making presentations.

**B. Background**

The Sacramento-San Joaquin Delta Estuary is a critically important part of California's natural environment and economy. In recognition of the complex resource management decisions that must be made, the State of California and the Federal Government, through the CALFED Bay-Delta Program, are working together to stabilize, protect, restore, and enhance the Bay-Delta system.

The vulnerability of the Delta levee system to failure during earthquakes is a significant concern to CALFED Bay-Delta Program agencies and stakeholders. In particular, the consequences that a western Delta levee failure could have on the State Water Project (SWP) and Central Valley Project (CVP) export facilities are of prime concern. Although levee failure from a seismic event has never been documented, the Delta has not experienced a significant seismic event since the levees reached their current size. Another significant threat to Delta levees is overtopping and instability caused by

seepage, erosion, subsidence, and insufficient mass, during flood flows. Since their reclamation, every Delta island has flooded at least once. Over the past 50 years, dozens of islands have flooded. Some islands have flooded many times and some islands have never been reclaimed.

The CALFED Delta Levee System Integrity Program is taking steps to identify the risks to Delta levees and present a suite of options to manage those risks. Over the past 25 years, the existing Delta levee program has reduced the overtopping and instability risks by improving Delta levees. This program has been, and will continue to be, one of the major strategies to address overtopping and instability risks to all Delta levees. Research and demonstration projects are being conducted to quantify the effects of subsidence and determine how to reduce its threat to Delta levees. Over the past two years, a seismic risk assessment was made by a group of experts in the fields of seismology and geotechnical engineering. The results of that assessment found that a significant seismic risk is present, that the consequences to Delta resources could be severe, and this risk should be addressed by an appropriate risk management strategy. CALFED will incorporate the findings from this seismic risk assessment into this RMA.

CALFED has committed to developing and implementing a RMS, in consultation with interested stakeholders, the public, and state and federal agencies.

### **C. Scope**

The scope of this analysis includes quantification of risks to Delta levees, evaluation of the consequences, and development of an appropriate RMS. This analysis will proceed through a phased approach. In Phase I, a (RMA ) Work Plan will be developed using only a seismic risk and consequences to SWP and CVP assets. Upon CALFED approval of the RMA Work Plan, that work plan will be used to quantify the risk due to seismic events. Depending on the results of Phase I, more risks and assets may be added.

Phase II of this effort will include the development of a RMS that documents the risk-based decision methodology that will be utilized to manage the risks identified during Phase I.

The Contractor shall:

- work with CALFED staff to assemble a Levee Risk Assessment Team,
- hire and direct the work of the non-government representatives on the Levee Risk Assessment Team,
- develop and implement a functional RMA Work Plan that will:
  - ▶ quantify the level of risk of failure of Delta levees from seismic loading;
  - ▶ quantify the resulting consequences to SWP and CVP assets due to Delta levee failure;
- develop, in conjunction with CALFED, potential risk management strategies that are consistent with CALFED's Preferred Program Alternative; and
- coordinate with CALFED program managers, agencies, and stakeholders.

Several potential risk management options have been developed. The available risk management options include but are not limited to:

- Improving emergency response capabilities,
- Developing storage south of the Delta,
- Reducing the fragility of the levees,
- Releasing more water stored north of the Delta,
- Restoration of tidal wetlands,
- Controlling and reversing island subsidence that effects levees,
- Curtailing Delta diversions,
- Continued monitoring and analysis of total risk, and/or
- Constructing an isolated facility.

The final RMS may include a combination of the above referenced options and/or others identified as a result of the RMA.

#### **D. Applicable Documents**

A copy of the following documents will be provided to the Contractor for their use in the completion of this SOW:

- a) *“Levee System Integrity Program Plan, Draft”*, CALFED Bay-Delta Program, June 1999 (or most current version).
- b) *“Revised Phase II Report, Draft”*, CALFED Bay-Delta Program, June 1999 (or most current version).
- c) *“Seismic Vulnerability of the Sacramento-San Joaquin Delta Levees, Final Draft”*, CALFED Bay-Delta Program, December 1998 (or most current version).

## **Part II Work Requirements**

### **A. Technical Requirements**

This SOW is based on a phased approach. The first task(s) will be completed and the results evaluated. Additional tasks may be requested based on the success of previous tasks as determined by CALFED.

#### **Task 1 – Levee Risk Assessment Team**

##### **Task 1.a – Assemble a Levee Risk Assessment Team:**

The Contractor shall work with the CALFED Point of Contact (POC) to assemble a Levee Risk Assessment Team.

Levee Risk Assessment Team members may include, but are not limited to:

- Risk Manager,
- Geotechnical Engineer,

- Seismologist,
- SWP/CVP representative,
- Bay-Delta Advisory Council representative, and
- CALFED representative(s).

Additional members may be added per the direction of the CALFED POC. Required knowledge, skills, and abilities to the various Levee Risk Assessment Team Members are specified in Attachment A of this SOW. **(NOTE: This needs to be developed)**

**Task 1.b – Levee Risk Assessment Team Management:**

The Contractor shall be responsible for hiring the non-government members and directing the work of the Levee Risk Assessment Team. CALFED will identify the participating government members and will arrange compensation for government members unless otherwise specified in writing by CALFED.

**Task 2 – Prepare a Risk Management Analysis Work Plan**

**Task 2.a – Development of a Draft Risk Management Analysis Work Plan:**

The Contractor shall develop, with the assistance of the Levee Risk Assessment Team, a functional RMA Work Plan, which defines the analytical approach to developing the RMA and explains how refinements in system complexity and performance would be incorporated. The Contractor shall evaluate risk-based decision making issues associated with the management of risks due to seismically induced Delta levee failures that result in impacts to SWP and CVP Delta facilities. The RMA Work Plan must be designed to allow additional Delta risks and assets to be added to the evaluation.

The RMA Work Plan shall develop a process to:

- quantify the level of risk of failure of critical Delta levees from seismic loading;
- quantify the resulting consequences to SWP and CVP Delta facilities due to Delta levee failure; and
- develop potential risk management strategies (a prioritized list of actions) to manage the expected risk and consequences that are consistent with CALFED's Preferred Program Alternative.

The Draft RMA Work Plan shall be structured to discuss these tasks/items:

1. *Goals* – The Draft RMA Work Plan will develop a statement of the goals for the analysis. The goal(s) should be concise and clearly stated.
2. *Define the Geographic Scope of the RMA* –
3. *Identify the Delta Systems and Assets* – The Draft RMA Work Plan shall include an inventory of elements of the Delta system and other assets whose performance must be evaluated. Initially, this inventory shall be limited to in-Delta SWP and CVP components.
4. *Identify and Screen the Seismic Hazards that Challenge the Integrity of the Delta Systems and Assets* – In this task/item, the Contractor shall identify seismic

hazards that challenge the integrity of SWP and CVP assets. The descriptions of hazards shall include a characterization of the type of load(s) that are imposed on the assets. This assessment should identify whether the events are independent or correlated.

5. *Identify the Consequences/Impacts of System Failure* – The Contractor shall compile an inventory of the potential consequences SWP and CVP assets.
6. *Define the Scope of a Formal, Quantitative Risk Assessment* – The Contractor specify procedures to conduct a formal quantitative Risk Assessment to evaluate the risks posed by concerns developed in Items 1-5 above. This assessment will also include, at a minimum, an evaluation of relative risks and the significance of those risks to CALFED’s goals; a consequence analysis; risk quantification; and a risk evaluation and mitigation analysis.

The Contractor shall coordinate with CALFED program managers, agencies, and stakeholders as needed. The Contract shall use the Seismic Vulnerability of the Sacramento-San Joaquin Delta Levees Report (See § D, Item C) as the basis for initial assessment and quantification of potential seismic risks.

**Task 2.b – Final Risk Management Analysis Work Plan:**

The Contractor shall finalize the draft work plan developed in Task 2.b. The final RMA Work Plan shall incorporate comments provided by the CALFED POC to the Contractor regarding deficiencies, necessary modifications, or improvements to the draft report.

**Task 3 – Conduct Risk Management Analysis**

**Task 3.a – Draft RMA Report:**

Upon approval of the Final RMA Work Plan, the Contractor shall conduct the RMA as specified in that work plan. The Contractor shall develop a Draft RMA Report that documents the RMA developed in Task 1. The Draft RMA Report shall include tables and figures, an executive summary, introduction, background, methods, analyses, summary, limitations, and conclusions and recommendations. At a minimum the Draft RMA Report will discuss each individual item identified in the approved Final RMA Work Plan. The Draft RMA shall make recommendations for prioritizing any additional key assets and/or risks that should be included in the final RMA Report.

**Task 3.b – Final RMA Report:**

The Contractor shall finalize the draft report developed in Task 3.a. The Final RMA Report shall incorporate comments provided by the CALFED POC to the Contractor regarding deficiencies, necessary modifications, or improvements to the draft report.

**Task 4 – Adding Additional Levee Risks to the RMA (Contingent)**

CALFED may want to include additional assets and/or risks in the RMA. At the direction of the CALFED POC, the Contractor will revise the relevant analysis and subsequent documents to include an evaluation(s) of additional assets and/or risks.

**Task 4.a – Add Overtopping (Contingent Task):**

Upon obtaining direction from the CALFED POC, the Contractor shall include an evaluation of risks due to overtopping of Delta levees, as an additional risk in the relevant analysis and subsequent documents.

**Task 4.b – Add Instability (Contingent Task):**

Upon obtaining direction from the CALFED POC, the Contractor shall include an evaluation of risks due to instability of Delta levees, as an additional risk in the relevant analysis and subsequent documents.

**Task 4.c – Add Delta channel flow capacity and circulation (Contingent Task):**

Upon obtaining direction from the CALFED POC, the Contractor shall include an evaluation of the risks to Delta SWP and CVP operations due to the loss of Delta channel flow capacity and circulation, as an additional risk in the relevant analysis and subsequent documents. Contractor shall coordinate with the current North and South Delta Improvement Programs to estimate level of risk and potential consequences.

**Task 4.d – Add Suisun Marsh Levees (Contingent Task):**

Upon obtaining direction from the CALFED POC, the Contractor shall assess the seismic risks to Suisun Marsh levees, quantify the resulting consequences to SWP and CVP operations, and develop an appropriate RMS.

**Task 5 – Risk Management Strategy (Contingent)**

Upon completion of the Final RMA Report, the CALFED POC may direct the Contractor to implement this task. These tasks are contingent and will only be undertaken by the Contractor following a notice to proceed on these specific tasks from the CALFED POC to the Contractor.

**Task 5.a – Draft Risk Management Strategy Report (Contingent Task):**

Upon obtaining direction from the CALFED POC, the Contractor shall develop a focused report that identifies potential strategies to manage the risks evaluated in Tasks 2, above. This report should consist of a short summary of the potential risks and strategies to manage those risks. The RMS Report may also use a series of tables to identify risk management options and/or priorities.

**Task 5.b – Final Risk Management Strategy Report (Contingent Task):**

Upon obtaining direction from the CALFED POC, the Contractor shall finalize the draft report developed in Task 5.a. The Final RMS Report shall incorporate comments provided by the CALFED POC to the Contractor regarding deficiencies, necessary modifications, or improvements to the draft report.

## **Task 6 – General Requirements**

### **Task 6.a – Meetings and Presentations:**

The Contractor shall be responsible for coordinating and participating in all Levee Risk Assessment Team meetings. The Contractor shall be responsible for arranging team meetings locations and logistics, scheduling meetings, preparing and distributing the meeting agendas and minutes, room arrangements, teleconferencing arrangements, and support equipment as necessary. It is anticipated that the Contractor shall coordinate and participate in **8 Levee Risk Assessment Team meetings**, during the duration of this SOW.

The Contractor shall also attend and participate in various CALFED meetings, including the CALFED Levees and Channels Technical Team meetings, as requested by CALFED. It is anticipated that the Contractor shall attend and participate, including presenting technical material and answering questions, in **10 non-Levee Risk Assessment Team meetings**, during the duration of this SOW.

The meetings generally occur on a monthly to quarterly basis, take place in Sacramento, and are approximately 2 to 3 hours in length. The Contractor may invoice only for the hours, travel, and/or unique services ordered by CALFED and actually used in this effort. Contractor participation in additional meetings will be negotiated separately.

### **Task 6.b – Contact Memorandum:**

The contractor shall provide memorandum, such as a Memo of Call, for each discussion or meeting with any party wherein information is given or received regarding the SOW. The memorandum shall be included in the project documentation.

### **Task 6.c – General Information Specified to All Tasks:**

Upon authorization, key staff of the Contractor's project team will meet with the CALFED POC to clarify the SOW, refine the deliverables, and define the project schedule.

### **Task 6.d – Key Personnel:**

The Contractor must identify key personnel to be assigned to this SOW. Key personnel may not be removed from the tasks without the express approval of the CALFED POC.

### **Task 6.e – Submittals**

All submittals of written documents must meet professional standards and shall, unless otherwise specified, include five (5) copies and one (1) unbound original (final documents shall be camera ready). Submittals will include text, figures, maps, tables, etc. assembled into final reports. In addition to any written material, the Contractor will provide electronic floppy diskettes (3.5") or compact discs (CDs) containing the written information in an IBM compatible DOS format. Information provided by the Contractor shall be compatible with the following software packages unless another format is

agreed on prior to delivery:

Office Suite	Microsoft Office 97 (including Word, Excel, Project, PowerPoint, and Access)
Graphics	Adobe Illustrator 8, PhotoShop 5, PageMaker 6.5 – for PC
Homepage	HTML
Geographic Information Systems	ESRI Arc Export or Shape

**Task 6.f – Report Format:**

Written materials developed under this contract are to use a format approved by the CALFED POC. The material shall be formatted in a manner to facilitate their incorporation into other documents. The Contractor will work with the CALFED POC to ensure correct formats are used.

**Task 6.g – Project Controls:**

Budget and schedule control tools will be used throughout the project to ensure that the tasks are completed on time and within the estimated costs. A monthly project status report will be prepared and delivered to the CALFED POC. The Contractor shall only take direction from the CALFED POC.

**Task 6.h – CALFED Point of Contact:**

All Contractor questions regarding this SOW shall be directed to the CALFED POC identified below:

**Ms. Tracie Billington ?**  
CALFED Water Management Planning Branch  
1416 Ninth Street, Suite 1148  
Sacramento, CA 95814  
Phone: (916) 651-6334  
Fax: (916) 653-5699  
E-mail: [tracieb@water.ca.gov](mailto:tracieb@water.ca.gov)

**B. Deliverables**

**Deliverables for Task 1.a (Assemble a Levee Risk Assessment Team)**

The Contractor shall submit, within 10 calendar days of award of this SOW, to the CALFED POC a list of the team member's names, including any sub-contractors that will participate in the Levee Risk Assessment Team. That listing will include discussions of each team member's capacities, addresses, phone numbers, and e-mail addresses along with a summary of the team member's knowledge, skills, and abilities that are relevant to completion of this SOW.

**Deliverables for Task 1.b – Levee Risk Assessment Team Management:**

The Contractor shall submit to the CALFED POC a copy of executed subcontracts with non-government employees within 60 calendar days of award of this SOW.

**Deliverables for Task 2.a – Development of a Draft Risk Management Analysis Work Plan:**

The Contractor shall submit to the CALFED POC a project schedule to carryout the non-contingent tasks under this SOW within 90 calendar days of award of this SOW. If contingent tasks are requested by CALFED, then the Contractor shall submit a schedule to CALFED for approval within 14 calendar days of CALFED's request. The Contractor shall submit the Draft RMA Work Plan for CALFED review in accordance with the approved schedule.

**Deliverables for Task 2.b – Final Risk Management Analysis Work Plan:**

The Contractor shall submit the Final RMA Work Plan for CALFED review and approval in accordance with the approved schedule.

**Deliverable for Task 3.a – Draft RMA Report:**

The Contractor shall submit the Draft RMA Report for CALFED review in accordance with the approved schedule.

**Deliverable for Task 3.b – Final RMA Report:**

The Contractor shall submit the Final RMA Report for CALFED review in accordance with the approved schedule.

**Deliverables for Task 4.a – Add Overtopping (Contingent Task):**

Upon direction to conduct this task, the Contractor shall include overtopping of Delta levees in the relevant analysis and subsequent documents.

**Deliverables for Task 4.b – Add Instability (Contingent Task):**

Upon direction to conduct this task, the Contractor shall include instability of Delta levees in the relevant analysis and subsequent documents.

**Deliverables for Task 4.c – Add Delta channel flow capacity and circulation (Contingent Task):**

Upon direction to conduct this task, the Contractor shall include the loss of Delta channel flow capacity and circulation in the relevant analysis and subsequent documents.

**Deliverables for Task 5.a – Draft Risk Management Strategy Report (Contingent Task):**

Within 30 calendar days of CALFED notice to conduct this task the Contractor shall submit the Draft RMS Report.

**Deliverables for Task 5.b – Final Risk Management Strategy Report (Contingent Task):**

Within 15 calendar days of CALFED notice to conduct this task the Contractor shall submit the Final RMS Report.

**Deliverables for Task 6.a – Meetings and Presentations:**

The Contractor shall provide, within 15 calendar days of each meeting, meeting minutes for all Levee Risk Assessment Team meetings. The Contractor shall also attend and participate, in an estimated total of 8 Levee Risk Assessment Team meetings, and an estimated total of 10 non-Levee Risk Assessment Team meetings. The Contractor shall provide, within 15 calendar days of each meeting, copies of any contractor generated presentation materials and meeting notes. The Levee Risk Assessment Team meeting minutes, other meeting notes, and presentation materials shall be included in the project documentation separate from the RMA Work Plan, RMA Report, and RMS Report.

**Deliverables for Task 6.b – Contact Memorandum:**

The contractor shall provide memorandum, such as a Memo of Call, for each discussion or meeting with any party wherein information is given or received regarding the SOW. The memorandum shall be included in the project documentation separate from the RMA Work Plan, RMA Report, and RMS Report.

**Deliverables for Task 4.d – Key Personnel:**

Deliverables to be included in Task 1.a.

**Task 4.g – Project Controls:**

A monthly project status report will be prepared and delivered to the CALFED POC.

**Part III Supporting Information**

**A. Security Access**

No special security access considerations are involved with performance of this SOW.

**B. Place of Performance**

Work is to be performed at Contractor location(s). However, it is anticipated that the Contractor shall attend and participate in meetings, as requested by CALFED. The meetings generally take place in Sacramento.

**C. Period of Performance**

The period of performance for these tasks is from the date of award through a date mutually agreed upon by CALFED and the Contractor and documented in the project schedule. This project may be incrementally funded, which would result in extensions to the end date of this project. Any unused hours may be carried over until exhausted at CALFED's prerogative.

**D. Special Considerations**

No special considerations are involved with performance of this SOW.