

Independent Review of  
Delta Risk Management Strategy Products

**Background**

The California Department of Water Resources (DWR) has initiated the Delta Risk Management Strategy (DRMS) to investigate the risk to assets of statewide interest resulting from levee failures in the Delta and Suisun Marsh areas of California, and to evaluate alternative strategies for mitigation of these risks.

There are approximately 1,115 miles of levees protecting 700,000 acres of lowland in the Sacramento-San Joaquin Delta. In the Suisun Marsh, there are approximately 230 miles of levees protecting over 50,000 acres of marshland. Many of these levees are old, and were not built to today's standards of levee design. California has an immense interest in maintaining many of the Delta levees, in part, because the Delta is a source of drinking water for about two out of every three Californians.

DRMS will look at the potential impacts on water supplies and other assets of statewide interest from levee failure in the Delta based on a 50-year, 100-year, and 200-year projection from impacts such as subsidence, earthquakes, flood, climate change, sea level rise, and any combination of these impacts. DRMS is scheduled to be presented to the state legislature no later than January 1, 2008. In order to meet that date, a final draft of the DRMS work must be submitted for review in the summer of 2007.

**Goals of DRMS**

- A. Evaluate the risk and consequences to the State (e.g., water export disruption and economic impact) and the Delta (e.g., levees, infrastructure, and ecosystem) from the failure of Delta levees and the risk to other assets considering their exposure to all hazards (seismic, flood, subsidence, seepage, sea level rise, etc.) under present as well as foreseeable future conditions. The evaluation will assess the total risk as well as a de-aggregation of the risk for individual islands.
- B. Propose an acceptable risk criterion for consideration of alternative risk management strategies and for the State's use in management of the Delta and the implementation of risk-informed policies.
- C. Develop a Delta Risk Management Strategy, including a prioritized list of actions to reduce and manage the risks of consequences associated with Delta levee failures.

**DRMS Workplan**

To perform the DRMS efforts, DWR has selected URS Corporation, from Oakland, California. URS Corporation has assembled an impressive list of sub-consultants, most of them from Northern California, who have an extensive history and knowledge of the Delta. In addition to the consultant team, DRMS has both a Technical Advisory

Committee (TAC), comprised of technical area experts from academia, other agencies, and consulting firms, and a Steering Committee (SC). The role of the TAC is to review interim work products, provide written comments, and advise if the methods used are appropriate. The SC members are policy advisors that represent various Delta interests.

Currently the DRMS program is separated into two phases:

- Phase 1 of DRMS focuses on trend analysis and risk analysis, with the result of this phase of work being the probability of economic and environmental damages under a "business as usual" scenario.
- Phase 2 is the risk reduction phase where the contractor will be investigating risk reduction measures based on the results of the Phase 1 work

In order to achieve the Delta Risk Management Strategy, the URS team will be preparing Technical Memoranda that describe the methodologies and processes used to perform critical elements of these analyses in a manner that is consistent with the overall DRMS risk analysis framework. Technical memoranda will be composed on each of the following topics:

1. Probabilistic Seismic Hazard
2. Flood Hazard
3. Climate Change
4. Subsidence
5. Levee Vulnerability
6. Emergency Response & Repair
7. Hydrodynamics Modeling
8. Wind Waves
9. Water Analysis/Water Management
10. Delta Infrastructure, Land Use, Life Safety
11. Environmental Consequences
12. Economic Consequences
13. Geomorphology

### **Independent Review of the DRMS Products**

External, independent reviews of the Draft Phase 1 and Draft Phase 2 DRMS products will be conducted. The purpose of these reviews is to assist the DRMS authors in making their report as accurate and effective as possible by providing a publicly available unbiased evaluation of DRMS technical methods, analyses, findings and conclusions; the final Phase 1 and Phase 2 DRMS products will incorporate or address all review comments. The reviews will be conducted by an Independent Review Panel who will evaluate and report first on the Draft Phase 1 Report (Risk Analysis Report) in May, 2007 and subsequently on the Draft Phase 2 Report (DRMS Final Report) in September, 2007. All technical memoranda (above) will be provided to the Panel as background material prior to the first Panel meeting. Additionally, DWR and its Partner agencies will appoint liaisons to the Panel who will provide information on the DRMS effort to Panel members

as needed throughout the review process including, but not limited to, presentations at Panel meetings, teleconferences, e-mails, etc. This will allow for rapid clarification and communication of issues and provide continuity of effort among all personnel throughout the study.

The independent reviews of Phase 1 and Phase 2 DRMS products will follow the process described below and scheduled in Table 1.

#### Phase 1 (Risk Analysis) Review

1. Informational Meeting: a preliminary meeting of the Independent Review Panel (IRP) will be held for two days in Spring 2007 following the completion of the Technical Memoranda and prior to the submittal of the Draft Phase 1 Report. The purpose of this first meeting is to exchange information on the DRMS effort, meet with various DRMS personnel and partner agencies, visit relevant sites, and discuss all aspects of the review effort relevant to the Panel's charge. Because the Technical Memoranda will not yet be public, attendance at this meeting will be by Science Program invitation only.
2. Draft Phase 1 Report Released to Public: the IRP will have access to the Draft Phase 1 Report about three weeks prior to the IRP meeting (see below). They will use these 3 weeks to familiarize themselves with the material and clarify issues as needed through literature research, contacting experts, etc. Approximately one week prior to the IRP meeting, the IRP members will receive all the technical comments generated during the public review of the draft Phase 1 Report.
3. IRP Meeting Day 1: On the first half of the first day (of the two-day panel meeting) the IRP will meet with DRMS personnel and other interested parties to publicly exchange information. The second half of the first day the IRP will meet in private to discuss details of the review and begin preliminary writing of the Review Document.
4. IRP Meeting Day 2: The first 2 hours of the second day (longer if needed) the IRP will meet with select DRMS personnel in private for more detailed questions and discussion, again targeted at information exchange. The majority of the second day the IRP will meet in private to continue preliminary writing of the Review Document. A brief presentation to the public will be made by the IRP at the end of the second day. A timeline for completion of the Review Document, including the identification of who is responsible for each section, will be given to the Science Program Review Coordinator.
5. Review Document: The IRP will produce a written Review Document that will focus on the technical issues and questions identified below in the "Charge to Panel". This Review Document will be presented to the Public by the IRP Chair at a public meeting and made available to the public through the CALFED Science Program website.
6. DRMS Response: DRMS personnel will compose a publicly available written response to the Review Document within 1 week of the release of the Review Document.
7. The CALFED Independent Science Board (ISB) will publicly comment on the

IRP Review Document and the DRMS response.

8. DRMS personnel will incorporate or address all issues raised by the IRP and ISB as part of the Final Phase 1 Report.

Phase 2 (Risk Reduction) Review (this review will follow the same format described above)

1. Draft Phase 2 Report Released to Public: the IRP will have access to the Draft Phase 2 Report about three weeks prior to the panel meeting (see below). Panel members will use these 3 weeks to familiarize themselves with the material and clarify issues as needed through literature research, contacting experts, etc. Approximately one week prior to the IRP meeting, the IRP members will receive all the technical comments generated during the public review of the draft Phase 1 Report.
2. IRP Meeting Day 1: On the first half of the first day (of the two-day panel meeting) the IRP will meet with DRMS personnel and other interested parties to publicly exchange information. The second half of the first day the IRP will meet in private to discuss details of the review and begin preliminary writing of the Review Document.
3. IRP Meeting Day 2: The first 2 hours of the second day (longer if needed) the IRP will meet with select DRMS personnel in private for more detailed questions and discussion, again targeted at information exchange. The majority of the second day the IRP will meet in private to continue preliminary writing of the Review Document. A brief presentation to the public will be made by the IRP at the end of the second day. A timeline for completion of the Review Document, including the identification of who is responsible for each section, will be given to the Science Program Review Coordinator.
4. Review Document: The IRP will produce a written Review Document that will focus on the technical issues and questions identified below in the "Charge to Panel". This Review Document will be presented to the Public by the IRP Chair at a public meeting and made available to the public through the CALFED Science Program website.
5. Review Document: The IRP will produce a written Review Document that will focus on the technical issues and questions identified below in the "Charge to Panel".
6. DRMS Response: DRMS personnel will compose a publicly available written response to the Review Document within 1 week of the release of the Review Document.
7. The CALFED Independent Science Board (ISB) will publicly comment on the IRP Review Document and the DRMS response.
8. DRMS personnel will incorporate or address all issues raised by the IRP and ISB as part of the Final Phase 2 Report.

## **Charge to the Independent Review Panel**

The IRP will provide written reviews that focus on the strengths and weaknesses of the technical material in the DRMS Phase 1 and 2 Reports. The reviews will be conducted with consideration to the DRMS project scope of work, including the project timeline and budget, so that review comments will be reasonable, constructive and useful.

Additionally, where appropriate, the IRP may recommend specific actions to enhance the value of the DRMS effort; these recommendations may fall within the existing scope of the DRMS project, or they may address areas beyond the original project scope that require additional effort.

The IRP will focus on the following subject areas and questions:

1. **Information Gathering:** Has the most appropriate scientific information been used in developing all technical areas? Are the methods of collecting information (existing or new) understandable, scientifically defensible, fully documented and the best available? What information (e.g. data, conceptual models, etc.) was not considered that should have been presented or addressed?
2. **Information Analysis and Results:** Have processes and methodologies (e.g. analyses of data) been used that are understandable, scientifically defensible, fully documented and appropriate? What results are missing that could reasonably be obtained? Are the modeling and risk analysis approaches employed defensible and consistent with other large scale projects elsewhere in the nation and internationally?
3. **Findings and Conclusions:** How well are the key findings and conclusions supported by the stated data, methodologies or conceptual models, and analysis results?

## **Independent Review Panel Members**

The Independent Review Panel will consist of 6-8 nationally renowned scientists and engineers who together cover the breadth of relevant issues needed to ensure a thorough evaluation of the DRMS effort. The Panel will include members who are selected expressly for their expertise and reputation in environmental, civil, hydraulic, and geotechnical (earthquake) engineering; hydrology, geomorphology, coastal hydrodynamics, and atmospheric science; ecology; risk and decision analysis; economics; infrastructure analysis; and engineering management. The Panel will be formed in the context of the CALFED ISB's normal concerns for conflict of interest and bias to ensure a balanced and objective review.

## **Products and Schedule**

The panel's work will result in two formal reports (in the form of Review Documents) to the general public that should be useful to the DRMS team and others in helping assure that their work is based on the most appropriate science and technology. The Review

Draft 11/10/06

Documents will be made available to the DRMS team and the public without restriction through a public meeting, posting on the CALFED web-site, and as a hard copy upon request.

**Table 1: Summary of the DRMS review process schedule and products:**

<b>Date</b>	<b>Item</b>	<b>Responsibility</b>	<b>Access</b>
1/16/2007	All DRMS Technical Memoranda complete	DRMS	IRP, URS, Agencies, SC, TAC
2/14-15/2007	Phase 1 Informational Meeting - Independent Review Panel and DRMS	Science Program	IRP, URS, Agencies, SC, TAC
3/16/2007	DRMS Draft Phase 1 Report for internal review	DRMS	IRP, URS, Agencies, SC, TAC
3/30/2007	DRMS TAC/SC Complete Review of draft Phase 1 Report	DRMS	IRP, URS, Agencies, SC, TAC
4/13/2007	URS Incorporates TAC/SC comments into Phase 1 Report and Prepares Exec Summary	DRMS	IRP, URS, Agencies, SC, TAC
4/13/2007	DRMS Draft Phase 1 Report for Independent Review Panel	DRMS	Public
4/16/2007	DRMS Draft Phase 1 Report Open to Public Comment	DRMS	Public
4/24/2007	Public Workshop on Phase 1 Report	DRMS	Public
4/30/2007	Close Public Comment Period	DRMS	Public
5/2/2007	Give Independent Review Panel Public Comments (Technical comments only)	Science Program / DRMS	Public
5/8-9/2007	Meeting - Independent Review Panel on Draft Phase 1 Report	Science Program / Panel	1st 1/2 Day 1 and final hour day 2 open to public
5/23/2007	Release and present Review Document on Draft Phase 1 Report	Review Panel Chair / Science Program	Public
5/30/2007	DRMS Response to review of Draft Phase 1 Report	DRMS	Public

6/6/2007	<b>ISB Meeting: discuss Review Document of Draft Phase 1 Report and DRMS Response</b>	<b>ISB</b>	<b>Public</b>
6/13/2007	<b>ISB Memo: Response to Review Document of Draft Phase 1 Report and DRMS Response</b>	<b>ISB</b>	<b>Public</b>
6/27/2007	Final Phase 1 Report	DRMS	Public
8/3/2007	DRMS Draft Phase 2 Report for internal review	DRMS	IRP, URS, Agencies, SC, TAC
8/17/2007	DRMS TAC/SC Complete Review of draft Phase 1 Report	DRMS	IRP, URS, Agencies, SC, TAC
8/31/2007	URS Incorporates TAC/SC comments into Phase 1 Report and Prepares Exec Summary	DRMS	IRP, URS, Agencies, SC, TAC
8/31/2007	Draft Phase 2 Report for Independent Review Panel	DRMS	Public
8/31/2007	DRMS Draft Phase 2 Report Open to Public Comment	DRMS	Public
9/11/2007	Public meeting to present Phase 2 Report	DRMS	Public
9/17/2007	Close Public Comment Period	DRMS	Public
9/19/2007	Give Independent Review Panel Public Comments (Technical comments only)	Science Program / DRMS	Public
9/25-26/2007	Meeting - Independent Review Panel on Phase 2 Report	Science Program / Panel	1st 1/2 Day 1, and final hour day 2, open to public
10/10/2007	Release and present Review Document on Draft Phase 2 Report	Review Panel Chair / Science Program	Public
10/17/2007	URS Response to Review Document on Draft Phase 2 Report	DRMS	Public

<b>10/24/2007</b>	<b>ISB Meeting: discuss Review Document of Draft Phase 2 Report and DRMS Response</b>	<b>ISB</b>	<b>Public</b>
<b>11/1/2007</b>	<b>ISB Memo: Response to Review Document of Draft Phase 2 Report and DRMS Response</b>	<b>ISB</b>	<b>Public</b>
11/9/2007	Final DRMS Phase 2 Report	DRMS	Public