STRATEGIC ECONOMIC APPLICATIONS COMPANY

RESOURCE SOLUTIONS WITH VISION AND VALUE

# THE SACRAMENTO SAN JOAQUIN DELTA – 2009

AN EXPLORATION OF COSTS, EXAMINATION OF ASSUMPTIONS, AND IDENTIFICATION OF BENEFITS

**THIS IS A DRAFT DOCUMENT**

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### EXECUTIVE SUMMARY

Table 1 presents estimates of Delta facilities costs, mitigation, restoration, and storage reservoirs. These costs are examined in text as well. Costs are preliminary with little more than reconnaissance or appraisal-level planning accomplished. The costs are also quite high, ranging from $23 to $53.8 billion depending on conveyance facility. Almost no cost information is available on mitigation and restoration costs do not exist at all. Table 1 also breaks costs down between project beneficiaries and general public, both groups having cost sharing responsibilities so far as early discussions indicate.

The project economics have not been accomplished to date. There is little information on what benefits in terms of long-term yield or project implementation timelines. The financing of such a monumental undertaking is sobering as well. Using a rule of thumb that for every $1 billion in bond financing at the State level, $64 million annual bond maintenance is expected (assuming 5% interest for 30 years). Thus, California debt servicing from such a monumental project would range from $1.5 billion to $3.4 billion annually. Deeper examination of the table reveals that only $6.5 billion would be financed through General Obligation Bonds. That financing would incur a $416 million annual debt service while Delta water users would shoulder the rest. For citizens unlucky to live in the Delta service area, they would pay for both the beneficiary financing as well as the general obligations encumbered for restoration and their share of the off-stream storage reservoirs.

## Table 1 - Delta Facilities, Summary of Costs

| Features | Configurations | | User Pays | | Public Pays | |
|---|---|---|---|---|---|---|
| | | | Isolated and Through Delta | Tunnel and Through Delta | Isolated and Through Delta | Tunnel and Through Delta |
| Conveyance, Isolated East | $4.2 B | | $4.2 B | | | |
| Conveyance, Through Delta | $9.8 B[1,2] | $9.8 B | $9.8 B | $9.8 B | | |
| Conveyance, Tunnel | | $33 B[3] | | $33 B | | |
| Mitigation | $4 B[4] | $2 B[5] | $4[6] | $2 | | |
| Restoration | $4 B[7] | $4 B | | | $4 B | $4 B |
| Off-Stream Storage | $5 B[8] | $5 B | $2.5[9] | $2.5 | $2.5 | $2.5 |
| Total | $23 B | $53.8 B | $20.5 B | $47.3B | $6.5 B | $6.5 B |

[1] Through Delta Improvements include levee earthwork, setback levees, channel dredging, intake, siphon, operable gates from California Department of Water Resources, "An Initial Assessment of Dual Delta Water Conveyance As requested by the Delta Vision Blue Ribbon Task Force," May 2008 [online] http://deltavision.ca.gov/BlueRibbonTaskForce/June2008/Item_7_Attachment1.pdf

[2] Both isolated as well as through Delta Facilities are required to provide the protection and yield from the Delta. This was from testimony of Greg Gartrell, Assistant General Manager, Contra Costa Water Agency, at the Joint Legislative Hearing on the 2009 Proposed Delta/Water, August 18, 2009

[3] From text

[4] This is a mid-range estimate. Estimates range from $2 Billion to $6 Billion from various sources.

[5] Assumed to be in the midrange of values.

[6] Users will pay for mitigation according to the testimony of Roger Patterson, Deputy General Manager, Metropolitan Water District of Southern California, at the Joint Legislative Hearing on the 2009 Proposed Delta/Water, August 18, 2009.

[7] This is a guess only for tabular use. This number could be greater due to the political characteristics of "restoration" and the definition that is finally agreed upon.

[8] Cost estimates presently are explained as ranges. For the purposes of this table, a total slightly lower than maximum was selected.

[9] Discussions on off-stream storage options include discussions on a 50/50 split between project beneficiaries and the general obligations of the public.

## BACKGROUND

The Strategic Economic Applications Company (SEACO) focuses our water practice on supply and management project implementation from the political, regulatory and economic perspectives. What is important to address and needs to be satisfied in order to actually finance and build a water supply project or promulgate a water management program? This may seem to be too basic a question when facing such a daunting environmental and engineering complexity like the Delta. However, the truth is that many decision makers attempt to move from conceptual understanding of solutions to project implementation by skipping most or all of the important planning and public-vetting steps required to actually succeed. Applying our experiences with implementing complex and controversial projects, we wade into the analytical works associated with the Delta to see if key analytical components have been adequately accommodated and thus signal that a project is ripe for implementation.

## THE ANALYTICAL CHALLENGE

There has been much discussion and angst over the Sacramento San Joaquin Delta and its environmental and water supply problems. Policy and politics argue with science and engineering to somehow "get past" the problems before they get any worse. Using the experiences gained on project implementation at SEACO, the decision was made to more closely examine what engineering and planning details have been proffered to better understand whether a Delta "solution" is actually realistically ready to be implemented. The key features of "implementability" are:

- Technical details adequate to determine feasible, engineering, economic, and financial aspects of the proposed project; and

- Political and social feasibility such that the project can be implemented in a timely fashion without endless debate and litigation.

While these features are simply-stated, accomplishing them is both the art and science of project implementation.

**Can we find these features elaborated in the Delta process?**
In order to answer the basic questions of whether a Delta solution is ready to be implemented, I reviewed as many technical documents as I could acquire. What follows is a brief review of each document with an analytical "eye" toward its adequacy for creating a plan that is ready to be implemented.

# Review of Key Planning "Features" To-Date

This section presents a review of select planning studies that have discussed Delta facilities, their costs, benefits, and stage of analytical robustness. While a number of Delta-focused "planning" processes are ongoing, it is not clear that a cohesive planning evaluation has been undertaken. The Delta has breathtaking environmental impacts and holds potentially seriously damaging economic prospects for water users in communities that rely on Delta water diversions. Solutions need to be feasible technically, economically, financially, and environmentally. Solutions don't necessarily have to be equitable or even fair to work. However, solutions do have to be politically feasible. This

means that no matter what acrimony, provincialism, or rancor emanates from the issues therein, the Delta solutions will have to be acceptable to a majority of interests as well.

## ENGINEERING

The first important planning "feature" that is required to assure that the project gets implemented is engineering feasibility. While there is a lively history of Delta facility "planning," there are only a few definitive engineering evaluations that I can identify. Those are reviewed below.

**Dual Delta Conveyance**

The Dual Delta Water Conveyance facility assessment represents a first cut evaluation of one idea for transporting water through or around the Delta.[10] An assessment of a Dual Conveyance System was requested in the Delta Vision Blue Ribbon Task Force November 30, 2007 report, *Our Vision of the California Delta*.[11,12] The assessment proposes facilities, estimates costs under various seismicity and hydraulic conditions, and recommends topics for further analytical work to better understand its recommended facility. The assessment appears to be a key document in ongoing discussions about Delta solutions.[13]

Estimated costs for two alternative alignments of an isolated facility; an eastern alignment and a western alignment. The western alignment cost is proposed as an estimate of $7.4 billion while the eastern alignment is proposed to an estimated $4.2 billion.[14] The document attributes the differences in costs to tunneling and pumping costs for the western alignment.[15] Finally, costs for the through Delta Component range from $1.2 to $9.6 billion with differences stated as a dependent upon the level of seismic protection included.[16] The report states that these figures are "just beginning" and will be refined through time and process.[17]

In order to appreciate the robustness or lack of these numbers, an exploration of the underlying engineering assumptions needs to be undertaken. The report states that estimates include a contingency cost for engineering, construction management, legal and project administration costs of "approximately" 30%.[18] This assumption illuminates the stage of planning that the report represents. A 30% contingency suggests that little detail has been defined and major planning and engineering work lies ahead. To best understand this level of planning it is important to understand how stages of planning are defined and how each of those stages can be used.

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[10] Ibid. p 15
[11] Ibid. page 1
[12] Blue Ribbon Task Force, "Our Vision for the California Delta," January 29, 2008, (Second printing), [online] http://deltavision.ca.gov/BlueRibbonTaskForce/FinalVision/Delta_Vision_Final.pdf
[13] For example, see Bay Delta Conservation Plan Steering Committee meeting handout #1 on May 8, 2009 that cites the DWR document, [online] http://www.resources.ca.gov/bdcp/docs/5.7.09_HO_Comparison_of_East_and_West_Isolated_Conveyance_Routes.pdf
[14] Op cit. California Department of Water Resources, p 4
[15] Ibid.
[16] Ibid.
[17] Ibid.
[18] Ibid. p 14

The United States Department of the Interior, Bureau of Reclamation (Reclamation) defines contingencies relative to the stages of planning:

> Contingencies [are] used in appraisal and feasibility estimates to estimate overruns on quantities, changed site conditions, change orders, etc. Contingencies are considered as funds to be used after construction starts and not for design changes or changes in project planning. Appraisal estimates should have 25 percent added and feasibility estimates should have 20 percent added for contingencies.[19]

Reclamation further defines appraisal level as "the level of detail necessary to facilitate making decisions on whether or not to proceed with a detailed study and evaluation of any alternative.[20] In practice Reclamation considers appraisal level planning stages "conceptual" and defines that as a "Class 5" planning stage. An example of Class 5 planning discussions can be observed in Reclamation's engineering work on the Auburn-Folsom South Unit. Here Reclamation defines Class 5 Concept Planning Stage as Little or no detailed design. Involves planning, evaluation of alternatives, available resources [and] has wide range of accuracy. Primary use and purpose to screen alternatives and determine feasibility.[21] Here Reclamation states that construction contingencies should be between 15 to 30%.[22] Most importantly however it the point that such uncertain stages of planning should lead to further evaluation and more detailed engineering.

As stated above, the Dual Delta Water Conveyance facility assessment should be taken at its word that the engineering detail and knowledge on this complex project is "just beginning.[23]"

**Should we base project implementation on this information?**

The California Department of Water Resources (DWR) has been forthright to suggest that this report is only a beginning. Policy makers would breach their fiduciary duties if they merely accepted this information as a basis to do anything more but more planning. While conditions are environmentally and economically dire, precipitous policy decisions will only cause further dissension in the face of limited fact and feasibility.

**An Isolated Facility**

The Isolated Facility, Incised Canal Bay-Delta System Estimate of Costs report was prepared for the State Water Contractors by the Washington Group International in August 2006 (SWC-WGI Report).[24] The SWC-WGI Report represents an engineering update of earlier engineering reports prepared by the CALFED Storage and Conveyance Refinement Team in 1997, DWR, Reclamation, with assistance from the Metropolitan Water District of Southern California.[25] Moreover, the SWC-WGI Report examined a number of existing engineering documents focused on Delta facilities

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[19] Reclamation, "Glossary," [online] http://www.usbr.gov/library/glossary/#C

[20] Ibid.

[21] US Bureau of Reclamation, Central California Area Office, Auburn-Folsom South Unit, Update of Cost, June 2006, Table 4-1, "Matrix of Construction Cost Contingencies," p. 4-3 [online] http://www.usbr.gov/mp/ccao/docs/auburn_rpt/Appendix%20E/TechMemo%20Auburn%20Dam%20Update%20of%20Cost%20and%20Appendix%20A%20(07-20-06).pdf

[22] Ibid.

[23] Op Cit. California Department of Water Resources, p 4

[24] The State Water Contractors, "Isolated Facility, Incised Canal Bay-Delta System Estimate of Costs," prepared by the Washington Group International, August 2006 [online] http://www.terratruth.com/uploads/1/7/8/4/1784071/wgi_canal_report_text.pdf

[25] Ibid. pp 1-2

including engineering reports on the Peripheral Canal prepared in 1973.[26] While the SWC-WGI Report is a careful re-evaluation of earlier engineering and it considered costs from more contemporary perspectives, it remains an appraisal or Class 5 Concept stage plan. The SWC-WGI selected two levels of contingency for their engineering re-evaluation; 20 and 30 %. They ultimately chose 30% contingency for the final report "because of the level of design information available and the need for further refinements to project design."[27]

The SWC-WGI Report found that an isolated facility incised canal would cost $3.3 to $3.7 billion in 2006 dollars.[28]

**Should we base project implementation on this information?**
The authors of the SWC-WGI Report have been forthright to suggest that this report leaves much engineering and design specifications work to be done. The conclusions state that "[t]here remains much engineering design work to be done to prepare adequate structure details, drawings, and specifications that will fully define the proposed project."[29]

**The Tunnel Under the Delta Facility**
A tunnel under the Delta from the north to the south has been suggested. A tunnel alternative would remove some of the terrestrial mitigation but no estimates have been made to date. The costs of such a tunnel facility have also not been estimated. For the purposes of this paper, I am substituting as reasonably equivalent, the London-Paris Channel Tunnel or "Chunnel" costs. The Chunnel is 31 miles long and cost $21 Billion in 1994.[30] Engineers escalate cost by disaggregating projects into their components: labor, materials, land, etc. and in great detail. For my purposes in this paper, I chose to use a conservative cost inflator of 3% annually. Thus, $21 Billion adjusted into 2009 dollars is approximately $33 Billion today. This estimate is obviously very rough as tunneling under the Delta in California may not be equivalent to tunneling beneath the English Channel. However, it is clear that tunneling is expensive.



[26] Ibid. p 3
[27] Ibid. p 14
[28] Ibid.
[29] Ibid.
[30] Public Broadcasting Corporation, Building Big, Wonders of the World Databank, [online] http://www.pbs.org/wgbh/buildingbig/wonder/structure/channel.html

**Off-Stream Storage Facilities**

Off-Stream Storage Reservoirs have been suggested and studied as part of a complete water supply solution. The Sites Reservoir and the Temperance Flat Reservoir are both considered important components of a Delta solution. Very preliminary evaluations have been conducted on these two facilities. On Sites Reservoir, DWR states: "The total project cost is estimated at $2.3 to 3.2 billion depending on conveyance options. The annual costs for operations, maintenance and power are estimated at $10 to $21 million. These estimates are based on preliminary feasibility studies and include all capital costs for construction, engineering, administration, environmental compliance and mitigation (including the costs of relocating infrastructure), legal, real estate and contingencies."[31]

The Temperance Flat Reservoir has also been preliminarily evaluated. DWR is using a price of $2 Billion for this facility pending the publication of the Plan Formulation Report and the Draft Feasibility Report/EIS-EIR in 2008 which I was not able to obtain at this time.[32]

**Concluding Thoughts on Engineering Feasibility**

There may be additional engineering evaluations that I did not review. However, it is not likely that they contain any more details than the two examples I presented above. Since both of those analyses self-identified as just the beginning or needing more work, it is questionable that a real project could come next. Engineering feasibility provides two key pieces of information critical to decision making:

1. Does it work or can it work?
2. What does it cost?

While both analyses provided cost estimates, those are both preliminary and incomplete. Other costs must also be estimated (see the section below entitled 'Environmental Mitigation and Restoration). Also not yet adequately analyzed is the question of "will it work?"

## ENVIRONMENTAL MITIGATION AND RESTORATION

While examining technical documents concerning facilities planning for solutions to the Delta problems, I reviewed documents that focus on environmental restoration. "Habitat Restoration and Enhancement Recommendation" from the Habitat SubGroup of the Bay Delta Conservation Plan Steering Committee describes the proposed habitat restoration and enhancement targets.[33] The targets are described in terms of enhanced inundated seasonal flows, restored channel margin, restored floodplain, restored tidal marsh, and restored riparian. This information is accompanied by a document that depicts a timeline and tidal marsh acreage following "initiation of a Bay-Delta

[31] California Department of Water Resources, Frequently Asked Questions, Sites Reservoir, September 2007, [online] http://www.water.ca.gov/storage/docs/NODOS%20Project%20Docs/Sites_FAQ.pdf#Question_1

[32] Ibid. Temperance Flat Reservoir, [online] http://www.water.ca.gov/storage/docs/USJ%20Project%20Docs/Temperance_FAQ.pdf

[33] Bay Delta Conservation Plan, Habitat SubGroup, "Habitat Restoration and Enhancement Recommendation Handout #3," May 8, 2009, [online] http://www.resources.ca.gov/bdcp/docs/5.8.09_HO_HabitatTargets.pdf

Conservation Plan."[34] The extend of restoration is, according to Handout #3, 55,000 acres under the Bay Delta Conservation Plan.[35]

While the efficacy of this plan is not under review, clearly there will be costs involved in implementing it. Legislative and governmental discussions reported in the media suggest that there are differences of opinion on who will be responsible for paying these mitigation and restoration costs. Some discussions have focused on alternative perspectives on financing Delta solutions and environmental mitigation.[36] Dean Misczynski, California Research Bureau describes that perspectives associated with "beneficiary pays" and points out the political difficulties in ascertaining who benefits from environmental mitigation and restoration and whether there is merit to calculate injury or damage assessment.[37] While there is no easy answer to allocating responsibility, the task is made harder with no cost estimates available. Thus, it does not make policy sense to suggest a cost allocation between water diverters for diversion facilities and the general public for environmental restoration unless each party can review the cost burden such an allocation implies.

## ECONOMIC EVALUATION, POLITICAL FEASIBILITY, AND SOCIAL REMEDIATION

With no engineering feasibility available, there has been no engineering economics provided. Engineering economics is only one small component of the economic evaluation of a project and its impacts. However small, it is by no means "disposable." The engineering economics of any Delta solution is a basic starting point for establishing a realistic project and Delta solution. Diversion facilities require more engineering as described in the above section on engineering feasibility. Moreover, the engineering components of the mitigation and restoration is highly necessary for a rational project evaluation. I have observed no engineering economics for either diversion facilities nor environmental mitigation and restoration.

Notwithstanding the lack of engineering economics and even more thorough basic engineering for diversion and mitigation facilities, the rest of the economic valuation is missing. The value of water diversions, benefits of mitigation and remediation, and the value of alternative solutions are all missing from the analytical discussion. Moreover, the opportunity costs (value) of the Delta agricultural and recreational sector, lifestyle, and intergenerational culture have not been calculated.

Political feasibility requires that a preponderance of interests support a decision and that decision can be implemented without long running litigation or other forms of impediments. One of the most likely sources of litigation or impediment to political feasibility comes from those whose agenda are to stop the project for whatever reason or those who feel they were left out of the process. Typically, both of these sources of impediment are not diverse or powerful enough by themselves to perpetrate impediment tactics. This is not the case in the Delta. Due to the extent of the social and economic activity associated with Delta viability, the process must include or invite them to participate. Evidence that potentially powerful blocs of interests were not included in the most

[34] Bay Delta Conservation Plan, Steering Committee Meeting Handout, April 3, 2009, [online] http://www.resources.ca.gov/bdcp/docs/4.3.09_SC_HO_Tidal_Marsh_Restoration_Targets.pdf

[35] Op. Cit. Handout #3, p 1

[36] Dean Misczynski, California State Library, California Research Bureau, "Financing Delta Improvements and Environmental Mitigation, Requested by the Delta Vision Blue Ribbon Task Force," September, 2008, [online] http://deltavision.ca.gov/ConsultantReports/Financing_Delta_Improvements_9-2008.pdf

[37] Ibid. pp 26-27

recent Delta solution processes is frequently highlighted in the media.[38] Power blocs of course can be overridden by adequate political clout from those intent on overruling. Sadly, this is a risky approach to solving serious environmental and economic issues such those represented by the Sacramento-San Joaquin Delta.

### FINANCIAL FEASIBILITY

A recently published document by the Public Policy Institute of California (PPIC) provides a most excellent background for a discussion of financing alternatives.[39] This analysis is forced to conclude that either water charges will be required to pay for the project or some sort broader legislative act like the federal Clean Water Act will be required.[40] My simplistic summary of this otherwise detailed and well-thought out analysis should not eclipse some key financing facts:

- If a "beneficiary pays" approach means that water users pay for part of the project and the "public" pays for other part through General Obligation Bonds or other General Fund approaches, failure is highly probable. "Water users" means water agencies and those agencies would need to finance their share to recover in water rates. The Public Policy Institute analysis suggests that water conveyance facilities could be easily financed by water agencies through existing project financing arrangements, or through a new fee levied by a new or existing state agency.[41] This is an important distinction since a "complete project" may include mitigation and restoration paid for by different beneficiaries. Thus, agencies seeking revenue bond financing for example would have difficulty convincing bond underwriters of the security of water revenues. Here the project is really not financially feasible.

- The Public Policy Institute report goes on to describe the current perspectives on environmental mitigation (focused on the state and federal water projects) and Delta levees.[42] I admit that I am a great fan of this PPIC document. However, it uncovers the serious problem in this Delta solution process. That is that there are no cost estimates and no identified "payees" for a number of critical components of the "Delta Solution Package Project."[43]

## Some Conclusions and Recommendations

This exploration into costs, examination of assumptions, and identification of benefits attempted to review just the "highlights" of documents associated with a controversial water problem. Uncovered was the fact that little engineering, no economic evaluation, and with no accurate and complete costs or identification of beneficiaries or "payees," no financing plan. This situation should strongly favor

[38] One example that makes this point comes from an Opinion Page article written by State Senator Lois Wolk, "Delta Residents Must Have Say in Delta Plan, The Sacramento Bee, August 7, 2009, [online] http://www.sacbee.com/opinion/story/2089967.html

[39] Dean Misczynski, "Fixing the Delta: How Will We Pay for It?," Public Policy Institute of California, August, 2009 [online] http://www.ppic.org/content/pubs/report/R_809DMR.pdf

[40] Ibid. p 45

[41] Ibid. p 8

[42] Ibid.

[43] Not even mentioned is the off-stream storage component whose costs, beneficiaries and payees have not yet been identified in detail. See Ibid.

an organized, inclusive, and cohesive planning process resulting in an implementable plan. In the following sections, conclusions and recommendations are proposed. While many fine minds and high energy individuals have labored years to bring this issue to its present situation, there still remains too many yet-to-be answered questions.

## CONCLUSIONS

There is not enough substantive engineering, economic, and thus financial information at this point to consider any Delta solution policy other than serious investment in answers. A rush to solution will result in no progress and no solution.

## RECOMMENDATIONS

The continuing planning process to resolve Delta issues needs to be inclusive and include Delta interests who will be impacted by any decisions made. Alternatives that are far afield from those under consideration need to be addressed. For example, alternatives that evaluate regional self-reliance in water, alternatives that consider impacts on other sources and theirs on the Delta like southern California's Colorado River supplies.

Alternatives and questions such as:

- Southern California Delta-free self reliance. Can southern California survive economically relying on local alternative supplies and stop depending on the Delta diversions from the State Water Project? Are there less expensive, more reliable recycling, desalination, and conjunctive management projects developable locally? What would happen to the political clout of the Metropolitan Water District as local project emerge as the principal supplies for their member agencies?

- Can the San Joaquin Valley survive with no Delta diversions? What water supplies would be needed for a sustainable San Joaquin Valley agricultural economy? What would the cropping changes and that economy look like? How can Valley interests assure sustainable conjunctive management of their ground water resources?

- What restoration and mitigation would the Delta require if no diversions occurred?

- What would the Bay Area Delta diverters do? Could they survive on local projects and programs?

- Can stormwater reuse and aggressive recycling play a new role in a sustainable California economy? What impacts on Delta water quality and habitat would such an approach reveal?

- What are the costs of these radically different alternatives? How do they compare with those of the Delta Facilities/Mitigation Projects?

- What is the "implementability" of these alternatives? Can these alternative projects be more easily financed than a Delta Facilities/Mitigation Project?