



Managerial Recommendations for the Lower Trinidad Project

Recomendación Gerencial Sobre el Proyecto de Bajo Trinidad

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Resumen Ejecutivo

Managerial Recommendations for the Lower Trinidad Project Executive Summary

Introduction

As a separate task order under the Program Management Advisory and Assistance Service Contract, the Program Manager Advisory Team (PMAT) have been requested to render a recommendation on the Lower Trinidad Project from which the ACP can make a managerial decision on the future conduct of additional studies. The recommendation is to be based upon the review of previous studies, project investigations and technical appraisals performed to evaluate its feasibility. In addition, the PMAT shall consider other critical non-technical elements of project development to render its managerial recommendation. The Task Order, however, is not intended for performing major new work or analysis on the Lower Trinidad Project.

Summary of Principal Findings

The principal findings resulting from the review and evaluation of the Lower Trinidad Project are outlined below:

1. The Lower Trinidad Project has been studied several times in the past over many years, and considerable information is available. The quality and quantity of information is generally acceptable, however due to the extensive time gaps between studies and changing methodologies, there are some uncertainties and inconsistencies in the information.
2. In general, the proposed design and construction concept presented by the ACP and its Geotechnical Advisory Board is judged as technically feasible using techniques developed for major reclamation works on soft marine deposits, with many successful precedents throughout the world.
3. Notwithstanding the above, the dam presents significant technical and construction challenges, particularly relating to;
 - Characteristics of the Atlantic Muck Formation
 - Underwater construction conditions and methods, including the cost effective installation of geotextiles at depth if necessary
 - Source and quality requirements for the large quantities of fill,
 - Relationship of the dam to other ACP activities, particularly channel deepening and a third set of locks and their influence on material use and disposal.

4. The Lower Trinidad Project is judged to be the preferred Project over the Rio Indio Project from the environmental and social viewpoint. From the environmental and socio-economic perspective, the Water Savings Basins will have the least negative impacts of the alternative water projects considered. The Channel Deepening project will have some possible negative impacts due to the drilling and blasting which may affect the manatee, if present in the area. The Lower Trinidad Project may also have an impact on the manatee. The Lower Trinidad Project will have most of the same environmental and socio-economic issues as the Rio Indio Project. However, the magnitude of the negative environmental and socio-economic impacts of the Rio Indio Project may make it more difficult to obtain international funding. The fact that the Lower Trinidad Project is in the existing Gatun Reservoir rather than an expansion into the western watershed is the single most important consideration from the environmental point of view. The people displaced by the Lower Trinidad Project will most likely be relocated within their same communities above the inundation zone but the Indio Project requires the resettlement of entire communities to another area.
5. The Lower Trinidad Project, to El. 30.5 m, is located within the current ACP land boundaries, and would appear to be more readily implemented than other major storage projects, such as the Rio Indio Project, which is located outside of the traditional ACP watershed. Consequently, until the Lower Trinidad Project costs are conclusively judged to be prohibitive or the Rio Indio Project is judged to be feasible from an environmental and social standpoint, it would be premature to discard the Lower Trinidad Dam Project from further consideration.
6. The cost of the project may prove to be prohibitively high in comparison to other viable water projects. Previous cost estimates for the Trinidad Dam range from \$350 million to \$800 million. The upper range appears to be based on very conservative and/or overly simplified design and construction assumptions and is judged to be high. The cost estimate is highly dependent on the total volume of fill, the material source, and the material quality requirements. We estimate that the cost of the scheme with the foundation improvements as described above, as a stand-alone project, would be of the order of \$ 600 million.
7. Alternatively, if the project is undertaken as part of a major Canal expansion, it can be considered as a potential beneficial use spoil from that program, thus allowing project costs to be assessed on the marginal additional cost of the scheme above other spoil disposal options. This would assist in making the Trinidad scheme far more cost competitive with other water resource options.
8. The Geotechnical Advisory Board has outlined a list of steps and an approach to better define the design concept and the attendant cost estimate for the Lower Trinidad Project. Their approach was judged as both reasonable and logical, but

it would involve a relatively large commitment of people and resources of the ACP.

Summary of Principal Recommendations

The recommended action items are outlined below:

1. The ACP should not at this stage proceed with a full feasibility study of the Lower Trinidad Project.
2. However, the ACP should continue further investigation into the Lower Trinidad Project. The goal of additional investigations would be to better define the conceptual design of the Lower Trinidad Project, and the estimate of capital costs, to a level of detail that would facilitate an objective comparison of the Lower Trinidad Project with the other water resource management options available to the ACP.
3. At this stage the study should be limited to about four to six months to suit the requirements of the Master Plan preparation, and be focused on several of the action items that were identified by the Geotechnical Advisory Board. Such a study would include the following:
 - a. Limited programs of cone penetrometer tests along the dam footprint to better define and confirm the strength characteristics of the proposed foundation.
 - b. Identification of potential sources of fill material.
 - c. Development of performance based seismic design criteria.
 - d. Consolidation of current ideas and designs into a probable Conceptual Design for the dam section to allow an accurate assessment of the overall material requirements.
 - e. Definition of suitable construction methods, including sequencing and staging of the operations.
 - f. Preparation of a detailed preliminary estimation of costs, including assessment of the project as a beneficial use of spoil.
 - g. Preparation of report and schedules to document the results.
4. As part of the alternatives analysis process, the ACP should make further objective comparisons of comprehensive water supply development scenarios, with the improved cost data on the Lower Trinidad Project, and decide the next steps - which could involve discarding the Project from further consideration or implementing a full Feasibility Study.
5. If, following further investigation and analysis of alternatives, a decision is made to proceed with a Feasibility study, it should include the design of a Test Fill Section which would be later implemented to obtain data of sufficient quality and

- quantity to minimize uncertainties, mitigate risks, and facilitate bidders including reasonable contingencies within their bid prices.
6. Environmental assessment of the Lower Trinidad project should be deferred until such time as a decision is made to proceed to a full feasibility study. If the decision is made to proceed with a feasibility study, an environmental assessment should be conducted simultaneously, and in close coordination or integrated with, the technical feasibility study.