

CORDOVA ELECTRIC COOPERATIVE, INC.

Memorandum

DATE: January 27, 2016
TO: Cordova City Council
FROM: ^{CK}Clay Koplin, CEC
RE: Crater Lake Feasibility Study Executive Summary and Conclusions

Please find attached an executive summary and conclusions from the Crater Lake Feasibility Study Final Report. Both the City of Cordova and Cordova Electric Cooperative will be posting the study on their websites for access to the full document.

At the February 3 regular meeting of the Cordova City Council, I will be presenting a summary of findings, recommendations, and next steps and be available for questions.

If there are any questions in the interim, the City Manager can relay them to me for the presentation.

Executive Summary

This report presents the results of a feasibility study of the Crater Lake Water and Power Project (CLWPP) performed by McMillen Jacobs Associates (McMillen Jacobs) for the Cordova Electric Cooperative (CEC) and City of Cordova (COC). This evaluation presents the fundamental geotechnical, engineering, construction, permitting and economic analyses required to make a Project feasibility determination. McMillen Jacobs analyzed the Project basis through a series of analyses, culminating in a Project conceptual cost estimate and cost/benefit analysis. These studies and conclusions are presented below.

Feasibility Study Focus	Conclusions
Geotechnical and Geohazards Analysis	No fatal flaw geotechnical or geologic hazards were identified, although significant field investigation will be required for design.
Baseline Hydrology Study	Crater Lake hydrology is sufficient to support a storage/hydro Project and represents both a water supply and renewable energy resource that could provide significant benefit to Cordova.
Water Supply System Evaluation and Penstock Sizing	COC of Cordova water system could benefit substantially from the additional, high quality water available through a storage resource. The existing water distribution pipeline can support this additional water.
Operations Modeling	The preliminary operations model showed multiple options for combined water/power supply and may offset as much as 25% of current diesel generation.
Initial Project Design Criteria and Conceptual Civil Design	The Project could employ conventional design and construction methods to develop a combined hydroelectric and water supply Project.
Permitting Evaluation and Strategy	No fatal flaws were identified in permitting. COC administers public lands and private land agreements could be negotiated. Permit requirements should be addressed early in the Project development cycle.
Constructability Review, Cost Estimate and Schedule	The Project is constructible with conventional and helicopter based methods. Cost estimates range from \$12M to \$26M, with a median cost of \$17.2M for the base Project. Further design is required to narrow this range.
Cost/Benefit Analysis	The Project shows promise with an estimated cost/benefit ratio for CEC of 1.36 (AEA method) and 1.27 (inflation adjusted). The Project shows both negative and positive outcomes for COC, depending on assumptions, with an estimated ratio of 0.83 (AEA method) and 1.09 (inflation adjusted).

This very interesting Project appears to be feasible to construct and operate and would provide significant energy and water supply benefits to CEC and COC. The economic analysis strongly supports Project development for CEC and appears marginal on a purely economic basis for COC, with the assumption of approximately equal cost-sharing for development. A more balanced cost/benefit is possible through modified assumptions on cost sharing. It is important to acknowledge the feasibility-level nature of this evaluation and recognize that additional analyses will be required to support design, cost estimating, additional operations modeling and cost/benefit sharing. These analyses will lead to a more refined cost and value for the Project. Lastly, CEC and COC should recognize the unique challenges and uncertainties associated with construction and operation of any Alaska heavy civil works Project.

11.0 Summary and Conclusions

This report presents the result of a feasibility level analysis and conceptual design for the CLWPPP. The analyses include:

- Existing data review and compilation
- Geologic and geotechnical reconnaissance
- Hydrologic evaluation
- Water supply and treatment evaluation
- Generation and operations model
- Conceptual civil design criteria and drawings
- Permitting scope and planning
- Feasibility-level cost/benefit analysis

The results of these efforts represent a feasibility-level assessment only to support whether or not to continue Project evaluations, evaluate further or move forward with the Project. These preliminary analyses indicate that:

- The Project appears to be constructible from a geotechnical perspective.
- The hydrologic resource at Crater Lake/Crater Creek is underutilized and appears to support the concept of a storage Project.
- The potential hydroelectric benefit may offset up to 25% of CEC diesel consumption.
- Crater Lake would provide high quality water supply and a more firm and reliable water supply resource for COC.
- The COC could incorporate planned UV treatment upgrades within a new CLWPP.
- The civil design for CLWPP is relatively straightforward and conventional.
- The Project appears to be constructible from a construction perspective, but will face the challenges of Alaska construction including steep, roadless access and reliance on helicopter material deliveries.
- The Project cost estimate provides a range of estimated costs from \$9.1 million to \$28.9 million, depending on configuration and level of estimate sophistication at the conceptual stage. The median cost for the preferred alternative is \$17.1 million.
- The Project is envisioned as a 3-year development effort, with the first year dedicated to design and permitting and the remaining 2 years for construction.
- It is anticipated that the permitting effort would be simplified through FERC non-jurisdiction, land ownership and administrative control and the assumption of interpretation by USACE as a Nationwide Permit #17 eligible Project.
- The Project cost/benefit analysis shows the Project as having a net benefit to CEC in all assumed Project configurations, while within the range of slightly negative to slightly positive net benefit

to COC, assuming a 52% to 48% equity sharing agreement, respectively. Future discussions toward an agreement between CEC and COC may alter this shared cost/benefit.

The overall results of the feasibility assessment appear to be favorable.