4.0 DEVELOPMENTAL ANALYSIS[72]

4.1 PROPOSED PROJECT ALTERNATIVES

4.1.1 Economic Assumptions

Under its approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division (72 FERC ¶61,027, July 13, 1995), the Commission employs an analysis that uses present day price levels to compare the costs of the proposed project and likely alternative power sources, with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. The Commission's economic analysis provides a general estimate of the potential power benefits and costs of the project and its reasonable alternatives. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

For our economic analysis of the LEAPS Project, we used the assumptions, values, and sources shown in table 42. Information supporting the assumptions was provided in the Elsinore Valley MWD and Nevada Hydro (2005, 2004a).

Table 42. Assumptions for economic analysis of the LEAPS Hydroelectric Project. (Sources: See source column and footnotes)

Assumption	Value	Source
Dollar basis	2005	Staff
Period of analysis (years)	30	Staff
Term of financing (years)	20	Staff
Interest rate	9.50%	Co-applicants
Return on equity rate[a]	12%	
Discount rate[b]	9.50%	Staff
Debt:Equity ratio	70:30	Co-applicants
Depreciation	Modified Accelerated Cost Recovery Systems (150% early on)	Staff
Insurance rate[c]	0.23%	Co-applicants
Property tax rate[d]	1.73%	Co-applicants
Federal income tax rate	34%	Co-applicants

[72] This is a standard section for Commission NEPA documents that does not necessarily reflect the methods or conclusions of the USFS staff on project economics. In this section, "we" means "Commission staff."

Assumption	Value	Source
State income tax rate	8.84%	Co-applicants
Escalation after 2005	0%	Staff
Simple-cycle Combustion Turbine Parameters		
Heat rate (MMBTU/kWh)	10,000	Co-applicants
Cost of natural gas ($/MWh)	62.17	EIA (2005)
Variable O&M cost ($/MWh)	9.28	CEC (2003, as adjusted by staff)
Fixed cost component (capacity benefit) ($/MW)	$81,800	CEC (2003, as adjusted by staff)
Energy Value Parameters		
Off-peak energy value at south of path 15 ($/MWh)	$40.00	Platts (2005)
Peak energy value at south of path 15 ($/MWh) rate	$57.65	Platts (2005)
Higher demand peak energy value at south of path 15 ($/MWh)[e]	$69.18	Platts (2005)

[a] The co-applicants assumed an after tax return on equity of 15 percent. Recent rate makings in California led staff to choose a before tax return on equity of 12 percent for purposes of this analysis.

[b] The discount rate is assumed equal to the co-applicants' interest rate on debt.

[c] The co-applicants provided an insurance figure of $2,000,000, which staff divided by a project cost of $866,333,000.

[d] The co-applicants provided a property tax figure of $15,000,000, which staff divided by a project cost of $866,333,000.

[e] The ratio for higher demand peak energy value to peak energy value is 1.20

4.1.2 Projected Energy Facility Costs for the No-action Alternative

The likely no-action alternative to the LEAPS Project that would provide a comparable amount of energy (1,560,000 MWh) and capacity is a 500 MW simple cycle turbine operating at a heat rate of about 10,000 Btu/kWh. Based on our review of recent energy prices in the state of California, such a project would have an annual cost of about $97.7 per MWh.

4.1.3 Projected Energy Facility Costs for the Co-applicants' Proposal

The co-applicants propose a pumped storage project with an upper reservoir located in Morrell Canyon and a powerhouse located at the Santa Rosa site. The detailed proposal is described in section 2.3. Staff independently reviewed the engineering costs associated with the LEAPS Project. Our review suggests that the co-applicants' estimated costs may be understated with regard to overburden excavation, disposal, and foundation preparation for the upper reservoir, the unit cost of tunnel excavation, the

length of the steel-lined section, seismic design features for the penstocks, engineering and construction management, and the allowance provided for contingencies.

The co-applicants' upper reservoir cost estimate does not explicitly include items for overburden excavation and disposal, foundation preparation, the dam concrete face plinth, and reservoir lining and drainage measures. The concrete plinth may be included in the face concrete so we have not added costs for this component. Although the proposed concrete-faced rock fill dam is not one of the conceptual designs presented by the co-applicants in exhibit F (figure F-2), it is probably the most suitable dam type for a seismically active region and for a reservoir subject to the rapid filling and drawdown associated with a pumped storage facility. Our review questions the co-applicants' proposed use of a random earth fill dam because of the risk of settlement and cracking of the facing.

A concrete-faced rock fill dam would require excavation of the overburden down to sound bedrock over approximately two-thirds of the base. Assuming that the rock fill quantities shown in the co-applicants' cost estimate were measured to the bedrock surface and not to the ground surface, excavation of the 25 to 50 feet of overburden at the Morrell Canyon site could amount to 25 to 40 percent of the dam fill volume. It is unlikely that the overburden would yield significant quantities of material suitable for a concrete-faced rock fill dam and that the material would require disposal. Therefore, we have increased the co-applicants' cost estimate by adding $6,500,000 for overburden disposal (at Morrell Canyon only), $10,000,000 for additional excavation, foundation preparation, and preparation of the surface for lining, and $6,000,000 for additional quarrying and haulage of suitable fill.

The co-applicants show a unit cost for tunnel and penstock excavation of $125 per cubic yard. Recent contracts for hard rock tunneling suggest that a unit cost of $200 per cubic yard would be more realistic, particularly in view of the double handling required at the powerhouse shaft and the possibility that haulage to disposal would be required. The co-applicants show the penstock excavation for the steel-lined section of the tunnel as 600 feet. However, the drawings of the penstock alternatives and table of quantities presented in the license application indicate 2,500 feet of steel lining would be required. We are uncertain if the ground slope has been taken into account and suggest that the length of the steel-lined section should be at least 2,800 feet. Assuming two lengths of penstock, as the co-applicants propose, the total length of steel lining would be 5,600 feet, or about 10 times the length included in the co-applicants' cost estimate. We also question the co-applicants cost estimate for the tailrace tunnel through the rock-to-soft ground transition zone, and we are uncertain as to the co-applicants' intended diameter of the tailrace penstock. Constructing two tunnels of 125 feet length, 40 feet diameter, and 150 feet depth to permit safe crossing of this transition zone could add $13,600,000 to the cost of construction. Therefore, we have added $13,875,000 for the higher unit cost of excavation of the tunnel and penstock shafts, $51,000,000 for the longer length of the steel-lined section of the penstock, and $13,600,000 for the transition zone tunnels to the co-applicants' cost estimate. Additionally, we included $5,000,000 for seismic design

features along the Willard Fault. We also determined that the co-applicants appear to have assumed three rather than two tunnels for purposes of estimating excavation costs. We have therefore reduced those costs by 1/6 or $25,722,000.

Finally, the co-applicants provided a contingency allowance of 20 percent in the license application, but only 2.28 percent in the revised cost estimate filed in response to the our request for additional information. The co-applicants' cost estimate does not appear to include costs for final designs, model tests, and construction management which would typically add 10 percent to overall project costs. The design is also at a very conceptual level. Contingencies of 30 percent and 15 percent would typically be added to the estimates for civil works, and mechanical and electrical equipment, respectively, at this stage of design development. Therefore, we have added contingencies of 30 percent and 15 percent to the co-applicants' cost estimate. Finally, we adjusted the financing and the other miscellaneous project cost categories to reflect the higher total capital costs.

We present our evaluation of these costs and the resulting total facility costs, excluding environmental measures, in table 43.

Table 43. Projected energy facility costs for the co-applicants' proposal (Morrell-Santa Rosa alternative, excluding environmental measures), including staff review items (*in italics*).

	Cost[a]	Subtotal
Site Preparation		
Co-applicants' cost	$15,425,000	$15,425,000
Upper Reservoir (Morrell Canyon)		
Co-applicants' cost	$59,275,000	
Overburden disposal	*$6,500,000*	
Additional excavation, foundation preparation and lining	*$10,000,000*	
Quarrying and additional haulage	*$6,000,000*	
Subtotal upper reservoir		$81,775,000
Tunnels and Shafts		
Co-applicants' cost	$154,332,000	
Lower total excavation length (reduction by one-sixth)[b]	*–$25,722,000*	
Higher unit cost of excavation	*$13,875,000*	
Additional steel liner costs	*$51,000,000*	
Willard Fault seismic mitigation	*$5,000,000*	
Transition zone shafts	*$13,600,000*	
Subtotal tunnels and shafts		$212,085,000
Powerhouse Cavern		
Co-applicants' cost	$62,570,000	$62,570,000

	Cost[a]	Subtotal
Powerhouse Auxiliary: Mechanical		
Co-applicants' cost	$5,725,000	$5,725,000
Powerhouse Auxiliary: Electrical		
Co-applicants' cost	$15,000,000	$15,000,000
Powerhouse Major Equipment		
Co-applicants' cost	$1,750,000	$1,750,000
Powerhouse Turbine Generators		
Co-applicants' cost	$64,200,000	$64,200,000
Lower Reservoir		
Co-applicants' cost	$17,448,000	$17,448,000
Subtotal major facilities		$475,978,000
Contingencies		
30 percent contingency on civil works	*$116,790,900*	
15 percent contingency on electrical-mechanical	*$13,001,300*	
Subtotal Contingencies		$129,792,200
Subtotal Without Transmission		$605,770,200
Transmission Line		
Co-applicants' cost	$304,064,000	$304,064,000
Additional staff contingency for transmission line	*$21,223,700*	
Construction Cost		$931,057,900
Elsinore Valley MWD Payment		
Co-applicants' cost	$1,329,000	
Additional payment associated with higher capital costs	*$439,200*	
Subtotal Elsinore Valley MWD payment		$1,768,200
Total Project Costs		$932,826,100
Feasibility study, associated site investigations, final design, model tests, and construction management	$93,105,800	$93,105,800
Project-related costs	$12,914,000	$12,914,000
Assumed environmental mitigation costs[c]	$0	$0
Interest during Construction		
Co-applicants' cost	$85,000,000	
Additional interest during construction with higher capital costs	$35,724,000	
Subtotal interest during construction		$120,724,000

	Cost[a]	Subtotal
Other Financing Costs		
Co-applicants' cost	$14,262,000	
Additional financing costs with higher capital costs	*$5,994,000*	
Subtotal other financing costs		$20,256,000
Financial Contingency		
Co-applicants' cost	$19,786,000	
Additional financing costs with higher capital costs	*$8,316,000*	
Subtotal financial contingency		$28,102,000
Development Fee		
Co-applicants' cost	$12,803,000	
Additional fees for higher capital costs	*$5,381,000*	
Subtotal development fee		$18,184,000
Subtotal Project Development Costs	$293,285,800	$293,285,800
Grand Total Project Costs		$1,226,111,900
Adjust to 2005 dollars		$1,275,646,800

[a] Costs are in 2003 dollars to permit a comparison with the co-applicants' cost estimate. Costs are converted to 2005 dollars in the final row.

[b] Lineal feet dimensions appear to reflect three rather than two conduit systems in Elsinore Valley MWD and Nevada Hydro (2005); however, additional analysis may be needed to resolve this issue including a complete review of all conduit quantities. Because there were changes in diameters as well we have made a one-sixth adjustment to the quantities rather than one-third.

[c] These costs are accounted for in a separate table.

4.1.4 Projected Energy Facility Costs for Staff Alternative

Commission staff and USFS staff suggest that a modified pumped storage project configuration with an upper reservoir located in Decker Canyon and a powerhouse located at Ortega location may reduce environmental effects while maintaining a comparable facility cost. This alternative is described in section 2.6. Staff has assumed that the engineering review conducted for Morrell Canyon alternative would also apply to Decker Canyon alternative, although the details of the omitted items might be somewhat different. Therefore we have included the same set of additional cost estimates to the co-applicants' cost estimate. In addition we applied the cost differentials developed by the co-applicants for each of the construction elements in response to our AIR (Elsinore Valley MWD and Nevada Hydro, 2005). We present our evaluation of these costs and the resulting total facility costs, excluding environmental measures, in table 44.

Table 44. Projected energy facility costs for the staff alternative (Decker-Ortega alternative excluding environmental measures), including staff review items (*in italics*).

	Cost[a]	Subtotal
Site Preparation		
Co-applicants' cost	$15,425,000	$15,425,000
Upper Reservoir (Decker Canyon)		
Co-applicants' cost	$80,021,250	
Additional excavation, foundation preparation and lining	*$10,000,000*	
Quarrying and additional hauling	*$6,000,000*	
Subtotal upper reservoir		$96,021,250
Tunnels and Shafts		
Co-applicants' cost	$161,267,000	
Lower total excavation length (reduction by one-sixth)[b]	*–$26,877,800*	
Higher unit cost of excavation	*$13,875,000*	
Additional steel liner costs	*$51,000,000*	
Willard Fault seismic mitigation	*$5,000,000*	
Transition zone shafts	*$13,600,000*	
Subtotal tunnels and shafts		$217,864,200
Powerhouse Cavern		
Co-applicants' cost	$61,410,000	$61,410,000
Powerhouse Auxiliary: Mechanical		
Co-applicants' cost	$5,725,000	$5,725,000
Powerhouse Auxiliary: Electrical		
Co-applicants' cost	$15,000,000	$15,000,000
Powerhouse Major Equipment		
Co-applicants' cost	$1,750,000	$1,750,000
Powerhouse Turbine Generators		
Co-applicants' cost	$64,200,000	$64,200,000
Lower Reservoir		
Co-applicants' cost	$17,448,000	$17,448,000
Subtotal major facilities		$494,843,450
Contingencies		
30 percent contingency on civil works	*$122,450,500*	$122,450,500
15 percent contingency on electrical-mechanical	*$13,001,300*	$13,001,300
Subtotal Contingencies		$135,451,800
Subtotal Without Transmission		$630,295,250

	Cost[a]	Subtotal
Transmission Line		
Co-applicants' cost	$304,064,000	$304,064,000
Additional staff contingency for transmission line	*$21,223,700*	$21,223,700
Elsinore Valley MWD Payment		
Co-applicants' cost	$1,329,000	
Additional payment associated with higher capital costs	*$485,800*	
Subtotal Elsinore Valley MWD payment		$1,814,800
Total Project Costs		$957,397,750
Feasibility study, associated site investigations, final design, model tests, and construction management	$95,558,300	$95,558,300
Project-related costs	$12,914,000	$12,914,000
Assumed environmental mitigation costs[c]	$0	$0
Interest during Construction		
Co-applicants' cost	$85,000,000	
Additional interest during construction with higher capital costs	*$34,516,000*	
Subtotal interest during construction		$119,516,000
Other Financing Costs		
Co-applicants' cost	$14,262,000	
Additional financing costs with higher capital costs	*$5,791,000*	
Subtotal additional financing costs		$20,053,000
Financial Contingency		
Co-applicants' cost	$19,786,000	
Additional financing costs with higher capital costs	*$8,035,000*	
Subtotal financial contingency		$27,821,000
Development Fee		
Co-applicants' cost	$12,803,000	
Additional fees for higher capital costs	*$5,199,000*	
Subtotal development fee		$18,002,000
Subtotal Project Development Costs	$293,864,300	$293,864,300
Grand Total Project Costs		$1,251,262,050
Total Adjusted to 2005 dollars		$1,301,813,000

[a] Costs are in 2003 dollars to permit a comparison with the co-applicants' cost estimate. Costs are converted to 2005 dollars in the final row.

[b] Lineal feet dimensions appear to reflect three rather than two conduit systems in Elsinore Valley MWD and Nevada Hydro (2005); however, additional analysis may be needed to resolve this issue including a complete review of all conduit quantities.

[c] These costs are accounted for in a separate table.

4.2 PROJECTED ENVIRONMENTAL COSTS

Staff developed estimates for the costs of environmental mitigation measures based on information provided by the co-applicants and agencies, and on staff experience with similar hydroelectric projects in California (refer to table 45). The details of the co-applicants' proposal, staff alternative, and agency recommendations are included in section 2.

Several of the items shown in table 45 appear similar. In these cases, the co-applicants may have proposed one measure to address a particular resource concern, an agency may have specified or recommended a slightly different measure addressing the same issue, and staff may have further modifications. The column titled "Staff Adopted" indicates the measures that would be included in the staff alternative.

The co-applicants estimated environmental mitigation capital costs at $14,450,000 (Elsinore Valley MWD and Nevada Hydro, 2005), including $6,450,000 for parks and recreation development and $8,000,000 for other environmental measure in 2003 dollars. Many of the co-applicants' environmental measures were not priced individually and had to be estimated by staff. We have footnoted those costs in table 45. We adjusted those costs by a factor or 1.04 to account for the effects of inflation between 2003 and 2005. After taking into account the unpriced measures, we estimate the annualized cost of environmental measures for the co-applicants' proposal to be about $1,920,700 based on an estimated capital cost of $14,073,000.

The estimated annualized cost of environmental measures for the staff alternative is about $4,068,600 based on an estimated capital cost of $28,790,850. Staff did not develop a full alternative for the Morrell Canyon location; however, we note that, should such an alternative be developed, several additional measures would likely be required by staff and agencies. Staff anticipates, for example, that a more sophisticated liner system, coupled with an upstream collection system and underdrain collection system for several known springs would potentially add in excess of $18,000,000 to the environmental costs. Additional measures such as relocation of the Morgan Trail and additional lands mitigation as shown in table 45 would further narrow the difference in cost between the Morrell and Decker upper reservoir locations.

None of the environmental measures proposed by the co-applicants, staff or agencies were deemed to have significant effects on energy generation or dependable capacity.

Table 45. Summary of capital and one-time costs, annual costs, and total annualized costs of environmental measures proposed by the co-applicants, included in the staff alternative, and recommended by others for the LEAPS Project. (Sources: Elsinore Valley MWD and Nevada Hydro, 2005, 2004a, and 2004b)

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
Soils and Geology						
1. Retain board of three consulting geologists/engineers	Co-applicants	$500,000		$70,500	Yes	**a**
2. Conduct additional geotechnical studies	Co-applicants	$1,000,000		$141,100	Yes	
3. Prepare erosion control plan prior to construction and implement during construction.	Co-applicants	$230,000		$32,500	Yes	
4. Prepare and implement an erosion control plan over the term of the license	USFS, Riverside County FCWCD	$70,000		$9,900	Yes	
5. Implement erosion control during construction and operation	Co-applicants	$1,922,900	$30,400	$301,700	Yes	
6. Implement erosion control during construction and operation including the mid-slope transmission alignment	Staff	$40,100	$1,200	$6,900	Yes	
7. Develop and implement a plan and design for construction of a system that will automatically detect a conduit or penstock failure and immediately shut off flow in the conduit or penstock at the headworks in the event of such a failure	Co-applicants	$91,000		$12,800	Yes	**a**

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
8. Develop a plan for clearing the reservoir area	Co-applicants	$35,000		$4,900	Yes	
9. Develop a plan to revegetate disturbed areas with native plant species beneficial to wildlife	Co-applicants	$30,000		$4,200	Yes	
Water Resources (Quantity)						
10. Pay an annual lake management fee to Elsinore Valley MWD to maintain Lake Elsinore at 1,240 feet msl or above.	Co-applicants		$1,872,000	$1,872,000	Yes	
11. Develop and implement a revised lake operating plan for Lake Elsinore, addressing increased minimum lake levels, flood control implications, and water supply issues	Co-applicants	$200,000		$28,200	Yes	
12. Develop and implement a plan for the installation of drainage and flood control measures and any water detention structures to control storm runoff over the term of any license issued for the project.	Co-applicants	$100,000		$14,100	Yes	**a**
13. Incremental additional program associated with upstream and seepage collection and delivery system and improved double liner system at Morrell Canyon	Staff	$18,000,000		$2,539,800	No	**b**

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
14. Develop and implement an upper reservoir and water conduit monitoring program to assess the effects of the upper reservoir liner and seepage collection systems, shafts, and tunnels on the groundwater levels and water quality, including installation of perimeter wells designed to establish groundwater levels and water quality prior to construction and to detect any changes after construction	Co-applicants	$500,000		$70,500	Yes	
15. Include specific remediation measures in the upper reservoir and water conduit monitoring program to allow immediate action to be taken if water or non-native aquatic species are released from the upper reservoir into the San Juan Creek drainage	Interior, staff				Yes	**c**
16. Include specific provisions in the upper reservoir and water conduit monitoring program to monitor groundwater levels during the construction and operation of the water conduits including the tunnels and penstocks that convey water between the upper reservoir and the powerhouse, specifying remedial actions if monitoring reveals changes in groundwater or seepage into the tunnels	Staff	$10,000	$2,100	$3,500	Yes	**d**

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
Water Resources (Quality)						
17. Develop and implement water quality plan to monitor DO and temperature in Lake Elsinore and Temescal during construction and operation	Co-applicants	$115,000	$15,000	$31,200	Yes	
18. Develop and implement a plan to determine the toxicity of sediments in Lake Elsinore and to provide for proper handling and disposal if toxins are identified	Staff	$50,000		$7,100	Yes	
19. Prepare an oil and hazardous substances pollution contingencies spill prevention control and countermeasures plan	Co-applicants	$10,000		$1,400	Yes	
Aquatic Resources						
20. Employ a qualified specialist to monitor construction activities in the aquatic environment	Co-applicants	$130,000		$18,300	Yes	
21. Develop and implement a detailed plan for environmental monitoring during construction by a qualified specialist for aquatic and terrestrial resources	USFS	$20,000		$2,800	Yes	

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
22. Establish appropriate setbacks from streams, avoid sediment discharges, and implement BMPs to avoid conflicts with the USFS steelhead recovery efforts in San Mateo Creek	Co-applicants			$0	Yes	**e**
23. Remove/reduce fish population via netting or rotenone poisoning during construction	Co-applicants	$50,000		$7,100	No	
24. Design and install intake screens for fish consistent with NMFS	Co-applicants	$8,000,000	$10,000	$1,138,800	No	
25. Consult with FWS and CDFG to develop intake fish screen criteria as specified by NMFS and modified, if necessary, to ensure screening addresses bass and crappie and other resident fish species in Lake Elsinore	FWS	$10,000		$1,400	No	
26. Establish limits of flow velocity rates of 1.5 to 1.8 feet per second at underwater intakes to reduce entrainment of sport fish	Co-applicants			$0	Yes	**f**
27. Monitor sport fish for entrainment and mortality (1 year)	Co-applicants		$9,300	$9,300	Yes	**d**
28. Develop and implement a plan to enhance near shore fish habitat that will aid in the establishment of naturally sustaining populations of desirable sport fish	Staff	$200,000	$10,000	$38,200	Yes	

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
29. Test behavioral avoidance devices if entrainment is significant	Co-applicants	$250,000	$9,100	$41,300	No	**d,g**
30. Reduce maximal operational drawdown during summer months following a winter with below-normal precipitation to control algal blooms that could result in fish kills.	Co-applicants			$0	No	**h**
Terrestrial Resources						
31. Employ a qualified specialist to monitor construction activities in the terrestrial environment	Co-applicants	$300,000		$42,300	Yes	
32. Conduct wetland delineations and prepare a habitat mitigation and monitoring plan for Corps, CDFG, and USFS approval	Co-applicants	$60,000	$6,700	$15,200	Yes	**d**
33. Develop and implement plan to prevent and control weeds	Co-applicants	$100,000		$14,100	Yes	
34. Consult with the USFS to develop and implement a weed management plan	USFS	$20,000	$20,000	$22,800	Yes	
35. Develop a Lake Elsinore monitoring and remediation plan to eliminate or reduce impacts to nesting shorebirds, waterfowl, and other birds	Interior	$20,000	$20,000	$22,800	Yes	**i**
36. Design and construct power line in accordance with APLIC et al. (1996)	Co-applicants, USFS	$20,000		$2,800	Yes	

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
37. Develop and implement bird-power line protection plan, following designs in the APLIC and FWS (2005) guidelines; develop and implement long-term avian protection plan	Staff		$20,000	$20,000	Yes	**i**
38. Conduct additional pre-construction special status plant and animal surveys for compliance with MSHCPs.	USFS	$100,000		$14,100	Yes	
39. For Morrell Canyon, mitigate loss of special status habitats at 2:1 ratio (oak woodland 40 acres; coastal sage scrub 62 acres)	Co-applicants	$2,060,000	$2,100	$204,100	No	**d,g**
40. For Morrell Canyon, evaluate effects in terms of MSHCP; mitigate based on equivalency analysis, minimum 1:1 ratio for habitat loss (194 acres)	Interior	$3,010,000	$3,900	$302,200	No	**d,g**
41. For Morrell Canyon, consult with agencies to identify appropriate parcels for mitigation of all habitat losses; mitigate 5:1 for oak woodlands (100 acres); 3:1 for coastal sage scrub (93 acres), 1:1 for chaparral and grassland (143 acres)	Staff	$6,025,000	$6,800	$596,000	No	**d,g**

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
42. For Decker Canyon, consult with agencies to identify appropriate mitigation of all habitat losses; mitigate 5:1 for oak woodlands (25 acres); 3:1 for coastal sage scrub (18 acres), and 1:1 for chaparral and grassland (216 acres)	Staff	$4,120,000	$5,200	$408,400	Yes	**d,g**
43. For Decker Canyon, evaluate effects in terms of MSHCP; mitigate based on equivalency analysis, minimum 1:1 ratio for habitat loss (227 acres)	Interior	$3,505,000	$4,600	$351,200	No	**d,g**
44. Provide $500 per acre for project effects within Stephen's Kangaroo Rat Assessment Area (28.25 acres)	Co-applicants	$15,000		$2,100	Yes	
45. Annually review list of special status species	USFS	$10,000	$4,800	$6,200	Yes	**g**
46. Re-survey known special status species habitat every 10 years; survey new areas as needed	USFS		$3,900	$3,900	Yes	**d**
47. Provide annual employee awareness training regarding special status plants and animals	USFS	$10,000	$10,000	$11,400	Yes	
48. Consult with FWS in developing final designs and measures to protect fish and wildlife	Interior	$10,000	$2,000	$3,400	Yes	**j**

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
49. In emergency, take immediate action to prevent or minimize further loss of fish and wildlife	Interior			$0	No	
50. Commission include ESA reopener provision in license	Interior			$0	No	**k**
Recreation						
51. Prepare a detailed plan of construction sites and laydown areas relative to recreational safety.	Co-applicants, USFS			$0	Yes	**l**
52. Implement safety during construction plan and include daily inspections for fire plan compliance, public safety, and environmental protection	USFS				Yes	**l**
53. Install fencing around upper reservoir	Co-applicants	$74,000	$2,200	$12,600	Yes	
54. Provide interpretive signage at upper reservoir site	Co-applicants	$7,000	$200	$1,200	Yes	
55. Construct and maintain an ancillary structure to complement the firefighters memorial (visitors information center) at a USFS-site off Ortega Highway	Co-applicants	$49,900		$7,000	Yes	**a**
56. Grade/contour/prepare site at the construction laydown area or another area for future development by USFS or another entity as determined by the USFS	Co-applicants	$18,700		$2,600	Yes	

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
57. Develop recreation facility at the construction laydown area for upper reservoir	USFS	$144,200	$4,000	$20,100	Yes	**d,g**
58. Relocate portions of Morgan Trail if the upper reservoir is in Morrell Canyon	Co-applicants	$18,700		$2,600	No	**a**
59. Develop and implement a recreation plan, including a botanical garden/community park at Santa Rosa or Evergreen powerhouse sites	Co-applicants	$5,610,800		$678,500	No	**g**
60. Provide public tours at powerhouse at any of the powerhouse locations	Co-applicants		$18,700	$18,700	Yes	**a**
61. Develop a hang glider landing site and provide for a community park if powerhouse is located at Ortega Oaks sites and a northern transmission alignment is selected.	Co-applicants	$5,610,800		$678,500	Yes	
62. Implement recreation plan providing for land transfer, development of recreation facility and O&M funding for community park development and/or hang gliding facility	Staff		$125,400	$125,400	Yes	**d**
63. Develop and implement fish stocking program for Lake Elsinore	Co-applicants	$10,000	$20,000	$21,400	Yes	

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
Land Use and Aesthetic Resources						
64. Acquire fee simple or leasehold interests in lands needed for project purposes by voluntary sale or conveyance to extent possible.	Co-applicants				No	**l**
65. Acquire and demolish the multifamily residences nearest the proposed powerhouse at Santa Rosa.	Co-applicants				No	**l**
66. Prepare and implement visual resources plan	Co-applicants	$20,000		$2,800	Yes	**a**
67. Develop, in consultation with Riverside County, and implement a plan to avoid effects to existing drainage facilities and to control any project-related drainage.	Co-applicants			$0	Yes included in plan for drainage and flood control measures	**l**
68. Additional excavation at Decker Canyon in lieu of trucking fill material uphill from powerhouse	Staff	$5,113,300		$721,500	Yes	
69. Achieve a balance of the excavation and fill materials at the Decker Canyon on reservoir site through additional excavation and dispose of all excavated material from all other project facilities off site.	Co-applicants				Yes	**l**
70. Participate in installation of traffic signal at Grand Avenue / Ortega Highway intersection.	Co-applicants			$0	No	**m**

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
71. For the Ortega Oaks power house location, dedicate and improve any additional rights-of-way	Co-applicants			$0	No	**m**
72. Develop and implement traffic management and control plans to address construction and access to and from the active construction sites	Co-applicants	$100,000	$10,000	$24,100	Yes	
73. Install temporary roads on the National Forest System lands only with USFS approval and according to USFS policies, and remove, re-contour, and re-vegetate roads following construction except where the USFS authorizes continued use of the roads for transmission line maintenance	Co-applicants				Yes	**l**
74. Consult with the USFS to develop road and traffic management plan on National Forest System lands	USFS	$10,000		$1,400	Yes	
75. Consult with appropriate authorities to develop road and traffic management plan on non-National Forest System lands for USFS roads	Staff	10,000		$1,400	Yes	
76. Alternative mid-slope transmission alignment	Staff	$2,496,000		$352,200	Yes	
77. Helicopter installation costs for co-applicants' proposed transmission line	Staff	$1,984,100		$280,000	Yes	

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
78. Additional Helicopter installation costs for mid-slope transmission alignment	Staff	–$92,300		–$13,000	Yes	
79. Incremental transmission alignment road costs for mid-slope transmission alignment	Staff	$337,500		$47,600	Yes	
80. Comply with noise element of Riverside General Plan and other applicable codes and standards	Co-applicants				Yes	**l**
Cultural Resources						
81. Consult with SHPO and the USFS at least 180 days prior to commencement of any land-clearing or land-disturbing activities	Co-applicants	$10,000		$1,400	Yes	
82. Stop all land-clearing and land-disturbing activities in the vicinity of such properties where unidentified archaeological or historic properties are discovered during construction and consult with the SHPO or the USFS on USFS lands	Co-applicants	$120,000		$16,900	Yes	**a**
83. Implement measures proposed in the draft HPMP filed with the Commission.	Co-applicants	$420,000		$59,300	Yes	

Measure	Entity	Capital and One Time Costs ($2005)	Annualized Operations and Maintenance Cost ($2005)	Total Annualized Cost ($2005)	Staff Alternative	Table Notes
84. Conduct paleontological monitoring of earth-moving activities on a part-time basis in locations that are sensitive for paleontological resources.	Co-applicants	$80,000		$11,300	Yes	
85. Prepare any recovered fossil remains to the point of identification, and prepare them for curation by the Los Angeles County Museum or San Bernardino County Museum	Co-applicants	$20,000		$2,800	Yes	
86. Revise draft HPMP in consultation with the USFS and file a final HPMP for Commission approval within 1 year of any license issuance.	Staff	$20,000		$2,800	Yes	
Total Co-applicants' Proposed Measures		$27,888,800	$2,005,700	$5,622,200		
Total Staff Adopted Measures		$26,602,200	$2,213,100	$5,670,600		

[a] These costs are staff estimates based on the co-applicants' description of the measure.
[b] This cost applies to the liner in the upper reservoir only at the Morrell Canyon location.
[c] Cost of developing remediation measures assumed to be included in staff measure, item no. 16.
[d] This measure includes O&M costs that are not constant over our 30-year economic evaluation period that follows construction.
[e] Cost for this measure is assumed to be included in the development and implementation of the co-applicants' erosion control plan.
[f] We expect that the costs associated with the limits for velocities are included in the fish screen cost estimate.
[g] This measure includes capital costs incurred in other than year 1 or during original construction.
[h] We assume that the co-applicants will address drawdowns in the lake management plan.
[i] Staff has added monitoring to this Interior-proposed measure.
[j] We assume that this consultation is limited to project design.
[k] An ESA reopener is a legal matter that will be addressed by the Commission in any license that may be issued for the project.
[l] We assume this cost would be included in the co-applicants' overall construction cost.
[m] We assume these costs are included in the co-applicants' costs for managing traffic to and from the construction sites.

We group expenditures on environmental measures by resource area and compare costs of the staff alternative to those of the co-applicants in table 46.

Table 46. Comparison of annualized costs of environmental measures by resource area and overall project costs. (Source: Staff)

Environmental Protection Measure	Co-applicants' Proposal (2005 dollars)	Co-applicants' Proposal (2005 dollars per MWh)	Staff Alternative (2005 dollars)	Staff Alternative (2005 dollars per MWh)
Soils and geology	$567,700	$0.36	$584,500	$0.37
Water resources				
Quantity	$1,984,800	$1.27	$1,988,300	$1.27
Quality	$32,600	$0.02	$39,700	$0.03
Aquatic	$1,214,800	$0.78	$68,600	$0.04
Terrestrial	$280,600	$0.18	$589,500	$0.38
Recreation	$744,600	$0.51	$887,500	$0.57
Land use and aesthetic resources	$26,900	$0.02	$1,418,000	$0.91
Cultural resources	$91,700	$0.06	$94,500	$0.06
Total Environmental	$4,943,700	$3.60	$5,670,600	$3.64

4.3 PROJECTED ENERGY COSTS

Both the co-applicants' proposal and the staff alternative would require a comparable amount of energy to power the pumps that raise water from the lower reservoir to the upper reservoir. In their most recent filing (Elsinore Valley MWD and Nevada Hydro, 2005), the co-applicants' estimate that 1,872,000 MWh of pumping energy would be required to generate 1,560,000 MWh of project energy. The co-applicants' did not refile the "Operational Spreadsheets" (Elsinore Valley MWD and Nevada Hydro, 2004a, exhibits A, B, C, D, F, and G) based on this slightly revised estimate, so we have assumed average values corresponding to the same 60 hours of turbine operation and 66 hours of pumping operation to analyze the energy costs

associated with the LEAPS Project. Table 47 includes our analysis of the "Maximum Generation Scenario" as described in section 2.1.3. The co-applicants did not provide this type of analysis in its license application (Elsinore Valley MWD and Nevada Hydro, 2004a) or subsequent filings. Our analysis assumes operation over a typical week that includes peak hours from 6:00 a.m. through 10 p.m. (16 hours per week day). We assume that half of these hours are extra high demand periods and classify them as higher demand peak hours such as those that might be served by a rapidly dispatchable pumped storage hydro project. Energy generated during these hours is estimated to have a 20 percent premium compared to regular peak hours. The remaining hours (10:00 p.m. through 6:00 a.m.) are classified as off-peak hours as are all weekend hours. We recognize that these definitions are subject to change over time and that there may be seasonal differences between summer and winter periods. Furthermore, our analysis may be slightly optimistic since several holidays throughout the year are classified as off-peak periods. Additionally, it may take up to an hour to switch from the turbining cycle to the pumping cycle. We have not included that level of refinement in our analysis.

We determine that over a typical week, the cost of generation to provide pumping energy during the periods specified by the co-applicants would be $1,632,500. On an annual basis this would amount to $84,890,000.

4.4 ECONOMIC COMPARISON

Based on the costs developed in sections 4.1 through 4.3, we estimate the total capital and annual costs for the co-applicants' proposal as shown in table 48. The co-applicants' proposal consists of the Morrell Canyon/Santa Rosa project configuration with staff's cost estimate adjustments, the TE/VS Interconnnect Project, and the co-applicants' proposed environmental measures. Similarly, we show the total costs for the staff alternative in table 49. The staff alternative consists of the Decker Canyon/Ortega project configuration, the mid-slope transmission alignment with up-slope segment, and environmental measures.

Table 50 compares the power value, annual costs, and net benefits of the no-action alternative, co-applicants' proposal and the staff alternative for the Leaps Project. The decrease in net benefits between the co-applicants' proposal and the staff alternative is about $2.4 per MWh.

Within the limits of the preliminary design of the project components, the overall costs of the co-applicants' proposed action and the staff alternative are within the same order of magnitude, although the staff alternative would be more costly. As shown in table 49, and discussed in section 4.4, the additional environmental measures and cost estimates would not significantly affect the project economics. During the final design phase of the project, the co-applicants would provide the engineering and cost estimate information to the Commission staff necessary to review the final design of each of the project components.

Table 47. Analysis of the pumping and turbining weekly cycles for the LEAPS Project. (Source: Staff)

Item	Hours	Energy Value ($2005)	Pumping Energy Required (MWh)	Cost of Pumping Energy ($2005)	Average Pumped Storage Generation (MWh)	Value of Pumped Storage Generation ($2005)
Higher demand peak hours	40	69.18	--	--	20,000	1,383,600
Peak hours	40	57.65	10,909	628,900	10,000	576,500
Off-peak hours	88	40.00	25,091	1,003,600	--	--
Total or average	168	51.15	36,000	1,632,500	30,000	1,960,100
Yearly			1,872,000	84,890,000	1,560,000	101,925,200

Table 48. Summary of projected annual costs and capital costs under the co-applicants' proposal. (Source: Staff)

Cost	Capital and One-time Costs	Annual Costs, Including O&M	Total Annualized Costs
Net investment in project excluding environmental measures	1,275,646,800		179,992,600
Environmental measures	27,888,800	2,005,700	4,943,700
Licensing cost	12,000,000		1,693,200
Total net investment	1,315,535,600		187,308,000
Materials and supplies		1,435,200	
Energy for pumping[a]		84,891,700	
Water supply and management services		1,872,000	
Dam Safety Program		100,000	
Insurance [b]			
General and Administrative		561,100	
O&M contingency[c]		1,920,000	
Subtotal operations and maintenance costs		88,908,000	88,229,500
FERC fees[c]		1,200,000	1,200,000
Subtotal annual costs			89,429,500
Total			276,737,500

[a] Pumping energy is based on average energy values at SP-15 for August 2004 through July 2005 assuming peak hours are 6 a.m. through 10 p.m. Monday through Friday and include 8 hours of super peak energy.

[b] Insurance costs are rolled into the annualized cost of the total net investment based on the co-applicants' estimate of 0.23 percent of the overall project cost.

[c] We estimate FERC fees at $1,200,000. Additional fees may be added for the use of federal lands. We have reduced the co-applicants' O&M contingency by this amount.

Table 49. Summary of projected annual costs and capital costs under the staff alternative. (Source: Staff)

Cost	Capital and One-time Costs	Annual Costs, Including O&M	Total Annualized Costs
Net investment in project excluding environmental measures	1,301,813,000		183,684,700
Environmental measures	26,602,200	2,213,100	5,670,600
Licensing cost	12,000,000		1,693,200
Total net investment	1,340,415,200		191,048,500
Materials and supplies		1,435,200	
Energy for pumping[a]		84,891,700	
Dam Safety Program		100,000	
Insurance[b]			
General and administrative		561,100	
O&M contingency[c]		1,920,000	
Subtotal operations and maintenance costs		88,908,000	88,908,000
FERC fees[c]		1,200,000	1,200,000
Subtotal annual costs			90,108,000
Total			281,156,500

[a] Pumping energy is based on average energy values at SP-15 for August 2004 through July 2005 assuming peak hours are 6 a.m. through 10 p.m. Monday through Friday and include 8 hours of super peak energy.

[b] Insurance costs are rolled into the annualized cost of the total net investment based on the co-applicants' estimate of 0.23 percent of the overall project cost.

[c] We estimate FERC fees at $1,200,000. Additional fees may be added for the use of federal lands. We have reduced the co-applicants' O&M contingency by this amount.

Table 50. Summary of annual net benefits for the no-action alternative, co-applicants' proposal and staff alternative for the LEAPS Project. (Source: Staff)

	No Action	Co-applicants' Proposal	Staff Alternative
Dependable capacity (MW)	500	500	500
Capacity benefit ($/MW)	81,800	81,800	81,800
Annual capacity benefit ($2005)	40,900,000	40,900,000	40,900,000
Generation (MWh)	1,560,000	1,560,000	1,560,000
Annual energy benefits ($2005)	89,932,200	101,923,100	101,923,100
Dollars/MWh	57.65	65.34	65.34
Overall benefits ($2005)	130,832,200	142,823,100	142,823,100
Dollars/MWh	83.87	91.55	91.55
Annual cost ($2005)	152,370,800	276,737,500	281,156,500
Dollars/MWh	97.67	177.40	180.23
Annual net benefit ($2005)	–21,538,600	–133,914,400	–138,333,400
Dollars/MWh	–13.81[a]	–85.84	–88.68
Change in annual net benefit relative to no-action alternative ($2005)		–112,275,800	–116,794,800
Dollars/MWh		–72.47	–74.87

[a] We have estimated net benefits based on time of day pricing as described in section 4.3. The net benefit for the no-action alternative is negative because under current economic assumptions the benefit from our assumed time of day pricing would not fully cover the estimated costs of a simple-cycle combustion turbine project.

4.5 COST OF ALTERNATIVE TRANSMISSION ALIGNMENTS

Over the course of preparing this NEPA document, staff evaluated three transmission line alternatives in detail (as described in section 2) including:

- Co-applicants' proposed transmission line (TE/VS Interconnect Project);
- Mid-slope transmission alignment.
- Each of these alternatives has a slightly different length and construction characteristics. The USFS is also evaluating the TE/VS Interconnect Project and alternatives in a separate document. Commission staff have analyzed the costs associated with the co-applicants' proposed transmission alignment and two alternative alignments. Table 51 summarizes the construction costs and characteristic for the three alternatives.

Table 51. Summary of construction costs and characteristics for three transmission line alignments. (Source: Staff)

Alignment	Overall Length (miles)	Buried Length (miles)	Helicopter Installed Length (miles)[a]	Access Road Length (miles)[b]	Total Construction Cost ($2005)[c]	Notes
Co-applicants' proposed transmission line (TE/VS Interconnect Project)	29.5	0	24.4	7.6	$327,271,800	**d**
Alternative mid-slope transmission alignment	30.7	0	23.8	10.3	$330,013,000	**f**

[a] This length results in additional cost for construction of transmission lines by helicopter in areas where slopes are greater the 15 percent.

[b] We assume that access road lengths are equal to 1.5 times the transmission line length and are required in areas with slopes less than or equal to 15 percent.

[c] Total construction costs include the applicants estimated transmission lines costs and contingency, additional staff contingency and other major construction items such as additional access roads, buried lines or helicopter aided construction. Certain environmental measures associated with erosion control and terrestrial lands mitigation, etc. are not included in this cost.

[d] We assume the co-applicant may have accounted for up to 50% of the helicopter aided construction costs in their cost estimate and have added an additional $1,984,100 for possibly unaccounted helicopter installation costs. We assume a transmission line tower every 1000 feet and that incremental helicopter costs would amount to one-half of $30,761 per tower.

[e] We assume that shorter line lengths in the area where slopes are greater than 15 percent result in saving of $30,761 per tower eliminated or in this case 3 towers or $92,300. We also account for longer access roads at $125,000 per mile or in this case $337,500. Because the overall transmission line is 1.2 miles longer, we also estimate an additional construction cost of $2,496,000.

4.6 SENSITIVITY TO TRANSMISSION LINE FACILITY COST OF THE LEAPS PROJECT AND OTHER FACTORS

Although we do no have a clear assessment of the potential economic benefits from a 30 mile transmission line that would also potentially serve as an intertie, we concur that such a project would provide benefits to regional utilities and the co-applicants would likely be reimbursed for such benefits and services including elements such as wheeling, increased reliability, and improved load flows. Studies conducted under the STEP concluded that an intertie, such as the TE/VS Interconnect Project, may lack the economic benefits to fully justify the costs. However these studies did not include significant strategic benefits such as improved reliability, better load diversity,

improved fuel diversity, access to lower cost power resources, more firm power, better opportunities for power exchanges, and improved sharing of reserves. When these items are factored in by the co-applicants, perhaps the economics of the transmission line would improve to either a break-even or positive benefit.

If we assume the co-applicants were able to cover the facility costs associated with the transmission lines by contracts with regional utilities, we estimate that the economics of the pumped storage project would improve by 33.3 dollars per MWh for the staff alternative as shown in table 52. Besides including benefits for the proposed intertie, the co-applicants may take into account escalating gas prices over time, other ancillary benefits not considered by staff and improved knowledge developed from detailed site investigations to improve the economic outlook for the LEAPS Project.

Table 52. Summary of annual net benefits for the no-action alternative, co-applicants' proposal, and staff alternative for the LEAPS Project excluding transmission line construction costs. (Source: Staff)

	No action	**Co-applicants' Proposal**	**Staff Alternative**
Dependable capacity (MW)	500	500	500
Generation (MWh)	1,580,000	1,580,000	1,580,000
Annual power value ($2005)	130,832,200	142,823,100	142,823,100
Dollars/MWh	83.87	91.55	91.55
Annual cost ($2005)	152,370,800	229,977,600	229,264,100
Dollars/MWh	97.67	147.42	146.96
Annual net benefit ($2005)	–21,538,600	–87,154,500	–86,441,000
Dollars/MWh	–13.81	–55.87	–55.41
Decrease from table 49		29.23	33.32

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