

APPENDIX D.1

***PROTECTION, MITIGATION, AND ENHANCEMENT
MEASURES SUMMARY TABLE***

Appendix D.1 ENLOE HYDROELECTRIC PROJECT Environmental Protection, Mitigation & Enhancement Measures

Proposed PM&E		Issue/Expected Outcome	Initial Cost	Incremental Cost	Frequency	Total Cost	
Water Quality	WQ 01	Temperature Monitoring	Effect of crest gates on water temperature		\$2,000	5	\$10,000
	WQ 02	Location of the Powerplant Tailrace	Bypass reach water quality	Included in construction costs			
	WQ 03	Provide Aeration in Flow Tubes	Reduction in DO below the dam	\$40,000	\$2,000	40	\$120,000
	WQ 04	Dissolved Gas Monitoring (TDG and DO)	Reduction in DO abd TDG below the dam	\$25,000	\$7,000	5	\$60,000
	WQ 05	Headworks Design	Minimize sediment disturbance	Included in construction costs			
	WQ 06	Erosion and Sediment Control Plan	Erosion control during construction	\$20,000	NA	NA	\$20,000
	WQ 07	Spill Plan	Reduce impacts from accidental spills	\$25,000	NA	NA	\$25,000
	WQ 08	Construction Sediment Management Program	Minimize sediment disturbance and maximize sediment containment	\$75,000	NA	NA	\$75,000
Fish	WQ 06	Erosion and Sediment Control Plan	Reduce impacts of sedimentation on fish	Included in WQ PM&E costs			
	FISH 01	Blasting Plan and BMPs	Reduce impacts of blasting on fish	\$100,000	NA	NA	\$100,000
	FISH 02	Placement of Boulder Clusters	Increase habitat quality and provide structure	\$50,000	NA	NA	\$50,000
	FISH 03	Transport of Large Woody Debris	Prevent the loss of LWD from downstream habitats		\$4,000	40	\$160,000
	FISH 04	Intake Trashrack	Protect upstream fishery	\$30,000	NA	NA	\$30,000
	FISH 05	Entrainment Studies and Fish Monitoring	Assess the impact of entrainment on the upstream fishery	\$100,000	NA	NA	\$100,000
	BOTA 02	Plant Riparian Vegetation Along the Reservoir	Vegetation will benefit aquatic resources	Included in BOTA PM&E costs			
	FISH 06	Tailrace Net Barriers	Prevent fish in the tailrace from swimming upstream into the draft tubes during periods of low flows	\$20,000	\$5,000	40	\$220,000
	FISH 07	Tailrace Video Monitoring	Monitor effectiveness of net barriers		\$10,000	2	\$20,000
	FISH 08	Run of River Operations	Avoid flow fluctuations that might adversely affect downstream resources	No additional costs			
	FISH 09	Relocation of Tailrace	Avoid impacts to fish that use the holding area below the falls	\$112,000	NA	NA	\$112,000
	FISH 10	Side Channel/Off Channel Development/Enhancement	Phases 1 and 2 - collect background information, evaluate and chose sites	\$120,000	NA	NA	\$120,000
			Phase 3 - Build,operate and monitor	\$360,000	\$3,000	40	\$480,000
	FISH 11	Gravel Supplementation ¹	Replace gravels may be held behind Enloe Dam reducing the gravel supply to the lower river.		\$45,000	5	\$225,000
FISH 12	Biological Review Process	Provide for ongoing refinement and measure of effectiveness of the PM&Es	\$15,000	\$10,000	40	\$415,000	
FISH 13	Fisheries Monitoring Database	Database will be used to examinelong-term trends and support decision making	\$45,000	NA	NA	\$45,000	
Wildlife	BOTA 03	Abandon Existing Shoreline Road	Substantially improve habitat along the reservoir for wildlife	Included in BOTA PM&E costs			
	BOTA 04	Plant Riparian Species Along the Corridor	Substantially improve habitat along the reservoir for wildlife	Included in BOTA PM&E costs			
	WILD 01	Transmission Line Pole Relocation	Reduce the effects of construction on bald eagles and other wildlife	\$500	NA	NA	\$500
	WILD 02	Construction Timing ²	Reduce the effects of construction on bald eagles and other wildlife	\$125,000	NA	NA	\$125,000

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Botanical	BOTA 01	Prepare a Mitigation and Monitoring Plan	Monitor effectiveness of habitat restoration	\$30,000	NA	NA	\$30,000	
	BOTA 02	Plant Riparian Vegetation	Net increase in riparian habitat over what currently exists	\$30,000	NA	NA	\$30,000	
	BOTA 03	Abandon Existing Shoreline Road and Restore Existing Road	Net increase in riparian habitat over what currently exists	\$350,000	\$5,000	5	\$375,000	
	BOTA 04	Plant Riparian Species Along Abandoned Road Corridor	Net increase in riparian habitat over what currently exists	\$15,000	NA	NA	\$15,000	
	BOTA 05	Plant Riparian Species on East and West Banks Downstream of Shanker's Bend	Net increase in riparian habitat over what currently exists	\$20,000	NA	NA	\$20,000	
	BOTA 06	Install grazing Control Measures	Net increase in riparian habitat over what currently exists	\$52,000	NA	NA	\$52,000	
	BOTA 07	Monitor Restored Areas and Replant if Necessary	Monitor effectiveness of habitat restoration	\$15,000	\$10,000	5	\$65,000	
	BOTA 08	Employ BMPs to Protect Riparian and Wetland Vegetation	Impacts associated with construction activities will be avoided or reduced	\$2,500	NA	NA	\$2,500	
	BOTA 09	Environmental Training Program	Impacts associated with construction activities will be avoided or reduced	\$5,000	NA	NA	\$5,000	
	BOTA 10	Provide a Biological Construction Monitor ³	Impacts associated with construction activities will be avoided or reduced	\$72,000	NA	NA	\$72,000	
	BOTA 11	Implement a Noxious Weed Control Program	Herbicide Program			\$1,250	40	\$50,000
			Re-establish grass using native grass mix ⁴		\$10,000	NA	NA	\$10,000
			Remove and stockpile soil and plants		\$3,000	NA	NA	\$3,000
			Avoid use of fertilizer in reclaimed areas	No additional costs				
			Use only certified weed-free straw bales for sediment barriers or mulch	No additional costs				
WQ 06	Erosion and Sediment Control Plan	Impacts associated with construction activities will be avoided or reduced	Included in WQ PM&E costs					
WQ 07	Spill Plan	Impacts associated with construction activities will be avoided or reduced	Included in WQ PM&E costs					
Historical	HIST 01	Solicitation for Powerhouse Ownership	Alternative use for the building	\$5,000	NA	NA	\$5,000	
	HIST 02	Demolition and Site Closure	Careful demolition of the powerhouse to create an interpretive site	\$85,000	NA	NA	\$85,000	
			Site Closure	\$35,000	NA	NA	\$35,000	
	HIST 03	Install Interpretive Panels	Preserve information on the current powerhouse	\$25,000	NA	NA	\$25,000	
HIST 04	Review and Agreement on the Draft HPMP	Concurrence by the CRWG on the HPMP and incorporation of this information within the PA	To be determined					
Archaeological	ARCH 01	Conduct Monitoring of Shoreline Areas	Minimize or avoid adverse impacts to archaeological resources, both documented and unrecorded	\$65,000	NA	NA	\$65,000	
	ARCH 02	Avoid Known Eligible Sites	Avoidance of adverse impacts to any NRHP-eligible sites	\$15,000	NA	NA	\$15,000	
	ARCH 03	Monitor Eligible Sites During Construction	Monitor construction areas to prevent damage to NRHP-eligible archaeological site(s)	Included with ARCH 01				
	ARCH 04	Inadvertent Discovery Plan ⁵	Protection of unidentified archaeological sites and TCPs and the minimization of adverse effect to sites inadvertently disturbed by construction activities	\$15,000	NA	NA	\$15,000	
	ARCH 05	Determine Potential Recreational Impacts to Archaeological Sites	Determine if there will be impacts to archaeological sites in the vicinity of the recreation facilities	To be determined				

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Geology and Soils	WQ 06	Erosion and Sediment Control Plan	Erosion control during construction			Included in WQ PM&E costs		
	WQ 08	Construction Sediment Management Program	Minimize sediment disturbance and maximize sediment containment			Included in WQ PM&E costs		
Recreation	BOTA 03	Abandon Existing Shoreline Road and Restore Existing Road	Improved and safer access to the east side of the dam			Included in BOTA PM&E costs		
	REC 01	Install Barricades and Fencing to Prevent Unauthorized Access	\$40,000	NA	NA	\$40,000		
	REC 02	Provide Recreation Access Below Enloe Dam	Foot access to the area below the dam will be improved			Included in BOTA 03 costs		
	REC 03	Transfer Ownership of Trestle Bridge ⁶	\$10,000	NA	NA	\$10,000		
	REC 04	Improve Existing Informal Boat Ramp	\$40,000	NA	NA	\$40,000		
	REC 05	Clean Up and Restore Wooded Area on East Bank	\$10,000	NA	NA	\$10,000		
	REC 06	Develop an Interpretive Publication	\$5,000	NA	NA	\$5,000		
	REC 07	Remove Existing Trash and Conduct Annual Cleanup	\$5,000	\$1,000	40	\$45,000		
	REC 08	Develop Parking Area	\$40,000	NA	NA	\$40,000		
	REC 09	Install Picnic Tables	\$15,000	NA	NA	\$15,000		
	REC 10	Develop Primitive Campsites	\$2,500	NA	NA	\$2,500		
	REC 11	Interpretive Signs	\$5,000	NA	NA	\$5,000		
	REC 12	Information Board	\$2,500	NA	NA	\$2,500		
REC 13	Recreation Management Plan ⁵	Provide an assessment of changes in recreational use to determine how well the new facilities are meeting demand			\$40,000	NA	NA	\$40,000

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Aesthetics	AES 01	Use Visually Compatible Colors and Building Materials	Outcome would be a landscape that resembles the natural vegetation community where	\$10,000	NA	NA	\$10,000
	BOTA 02	Plant Riparian Vegetation	Outcome would be a landscape that resembles the natural vegetation community where	Included in BOTA PM&E costs			
	BOTA 07	Monitor Restored Areas and Replant if Necessary	Outcome would be a landscape that resembles the natural vegetation community where	Included in BOTA PM&E costs			
	BOTA 08	Employ BMPs to Protect Riparian and Wetland Vegetation	Outcome would be a landscape that resembles the natural vegetation community where	Included in BOTA PM&E costs			
	AES 02	Consult with the CCT During Restoration Activities	CCT should be consulted during the restoration activities as there are known TCPs	\$20,000	NA	NA	\$20,000
	AES 03	Use Non-Reflective Surfaces Where Possible During Construction	Reduction of visual impacts during construction	No additional costs			
	HIST 03	Install Interpretive Panels	Provide historic images of water over the dam	Included in HIST PM&E costs			
TOTAL COST FOR PM&E Measures			\$2,357,000			\$3,772,000	

¹Begins in Year 3

²Assume contractor must work 20 employees an additional 10 hours of overtime per week for 20 weeks and that the average increased cost for overtime is \$25/hr and a contractor markup of 25%.

³Assume one inspector for 10 hrs a week at \$100 per hour for the 18mos.of construction

⁴Seed costs are estimated at \$1,000, total costs are estimated at \$10,000

⁵Costs are for Plan development only; implementation costs are to be determined

⁶Costs for transfer are shown in this table; value of the the donation is estimated to be \$1,000,000