

Table 6.1 Environmental Monitoring Plan (EMoP) with Environmental Quality Performance Levels (EQPLs)^{1,2,3}
Jalaur River Multi-purpose Project Stage II (JRMP II) Dam Project

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling and Measurement Plan			Lead Person	Annual Estimated Cost	EQPL MANAGEMENT SCHEME					
			Method	Frequency	Location			EQPL RANGE			MANAGEMENT MEASURE		
								ALERT	ACTION	LIMIT	ALERT	ACTION	LIMIT
I. PRE-CONSTRUCTION PHASE													
Social Preparation	People: Apprehensions of the community that commitments made by the proponent will be good up to meeting only. Presentation of collected issues and concerns to the council for confirmation/ verification	No. of IEC/FGD activities and public consultations conducted.	Focus Group Discussions (FGD); Key Informants Interview (KII); Public Consultations (PC)	Once	Directly impacted barangays	NIA	Part of admin cost					The proponent will implement commitments indicated in the Environmental Management Plan which includes among others Social Development Framework, IEC Framework, Emergency Response Policy and Generic Guideline. Likewise, the proponent, in partnership with different stakeholders will also implement Environmental Monitoring Plan	
	People: Conflict/complaints	No. of PAFs paid No. of PAFs relocated	Inspect records	Semi-annual	Affected brgys.	NIA	Part of RAP					The proponent shall implement agreements with PAFs	
	People: Capacity/resiliency	No. of trainings conducted No. of pax	KII	Annual	Affected municipality	NIA	Part of RAP					Training based on TNA results	
	Land: Land Use Conflict / Encroachment in ancestral domains	No. of land use conflicts settled No. of agreements/memorandum of understanding executed	Counting	Once	Host barangay	NIA/Tribal Chieftain	Part of admin. cost					Memorandum of Understanding between owners/claimants and proponent to the area and secure NCIP Compliance Certificate.	
II. CONSTRUCTION PHASE													
Clearing of land for	Land: Loss of	No. of trees felled Area of vegetation	100% Inventory of trees to be	Quarterly	Area to be constructed	DENR-CENRO						Clearing of land will be done in phases. Existing	

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construction of facilities	trees/vegetation affecting the groundwater supply	removed	affected, Transect and quadrat method		Baseline sampling station for flora	Iloilo PCO MMT	P150,000					trees in the site are preserved and reforestation projects are regularly conducted by the proponent. Cutting of trees will be minimized however; if tree cutting is unavoidable appropriate tree cutting permit will be secured from DENR. Rehabilitation should be conducted after construction.	
	Land: Destruction of habitat for wildlife/disturbance of wildlife	Wildlife biological indices	Transect and quadrat method	Quarterly	Baseline sampling stations for fauna	NIA PCO MMT	P150,000					Confine construction activities within structure footprint only. Minimize destruction of habitat for wildlife adopting footprint technology.	
	Air: Generation of dust and other particulate matters	TSP PM ₁₀	High volume - gravimetric	Quarterly	Baseline sampling stations for air	NIA PCO MMT	P150,000	Exceed- ance to DAO 2000- 81			DAO 2000-81	Regular sprinkling or watering of disturbed areas to minimize dusts.	
	Water: Siltation of creeks & rivers	Group 1: pH, temp, DO, conductivity, TSS, Oil and Grease, total coliform, fecal coliform Group 2: Heavy metals (Health significance and aesthetic quality)	Grab sampling	Group 1: Quarterly Group 2: Semi-annual	Baseline sampling stations for surface H ₂ O and ground water	NIA PCO MMT	P150,000	Exceed- ance to DAO 96-34			DAO 96-34	Provision of silt traps and series of siltation ponds to minimize surface run-off into the water bodies. Immediate planting of trees to serve as catchment for eroded soil to prevent siltation of water bodies.	
	People: Incidence of respiratory illnesses	No. of sickness occurrences	Medical report	Semi-annual	Project site Host barangay	NIA PCO MMT	P150,000					Vulnerable workers will be provided with personal protective equipment (PPE)	

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													to ensure their protection from dusts and fumes coming from the operation of vehicles and equipment. Employer shall ensure that provisions of DAO 2000-98 are followed.
	People: Generation of jobs/ employment	Jobs created	No. of local workers hired	Semi-annual	Project site Host barangay	NIA Officer/ Operations Manager	Part of development & operation cost						Priority will be given to qualified residents of the locality.
	People: Increase in taxes	Taxes and revenues, permit fees	Amount of taxed/permit fees paid No. of beneficiaries	Annual	Barangays	NIA Admin Officer/ Operations Manager	Part of administrative cost						On-time payment of taxes and permit fees. Provision of Social Development and community assistance programs for direct impact areas, etc.
	People: Potential exposure of workers to accidents and hazards	Accident Training of workers on EHS	No. of trainings conducted	Annually	Project site	NIA PCO/EHS	Part of safety & health program						Employer shall implement relevant provisions of Occupational Safety and Health Standards Regular conduct of training of all workers and conduct of EHS drills.
Construction of Dam, Diversion Canal, Access Road and other civil works	Air: Increased emission of SO ₂ and NO ₂	SO ₂ and NO ₂	Sulfur Dioxide: Gas Bubbler and Pararosaniline Method or Flame Photometric Detector Nitrogen Dioxide -	Quarterly	Baseline sampling stations for air	NIA PCO MMT	P150,000	Exceed- ance to DAO 2000- 81			DAO 2000-81 guide- lines		The proponent will ensure that all vehicles and heavy equipment will satisfy the regulatory requirements of government agencies with regards to compliance to the Clean Air Act (CAA).

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			Gas Bubbler Griess-Saltzman, or Chemiluminescence Method											
	1. Water: Spillage of fuels and oil	Volume of fuel & oil	Direct measurement	Quarterly	Motor pool area/ Power house	NIA PCO Maintenance mechanic Haulers/Con tractors MMT	Part of operation cost P150,000							Proponent will ensure that storage areas for fuel and oil will satisfy basic requirements. Used oil will be properly stored and transported to accredited used oil processors.
	2. Water Quality of Surface Water													
	2.1 Damsite Siltation	Total Suspended Solids (TSS)	Grab sampling; RA9725 lab analysis method	monthly	Sampling Site Station 1,2,3	PCO NIA	P500/sample * 2 bottles/ 3 station/mo *12 mo/yr = Php 36,000	EQPLs to be established at post-ECC	2.1 Damsite Siltation	Total Suspended Solids (TSS)	Grab sampling; RA9725 lab analysis method			
	2.2 Disturbance of normal water flow due to cofferdamming	color and turbidity	turbidimeter	as need arises	random sampling along the river	PCO NIA	-	EQPLs to be established at post-ECC	2.2 Disturbance of normal water flow due to cofferdamming	color and turbidity	turbidimeter			
	2.3 Destruction of natural waterways due to canal excavations and borrowings	actual land usage	ocular inspection within the project site	as need arises		PCO NIA	-	EQPLs to be established at post-ECC	2.3 Destruction of natural waterways due to canal excavations and borrowings	actual land usage	ocular inspection within the project site			
	2.4 Streambed and riverbanks erosion as a result of structure	depth of river and volume of silt accumulated		as need arises	random sampling along the river	PCO NIA	-	EQPLs to be established at post-	2.4 Streambed and riverbanks	depth of river and volume of silt				

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			Method	Frequency	Location			EQPL RANGE			MANAGEMENT MEASURE		
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	construction/excavation							ECC	erosion as a result of structure construction/excavation	accumulated			
	People: Incidence of respiratory illnesses	No. of sickness occurrences	Medical report	Annual	Project site Host barangay	NIA Admin Officer/ Operations manager	Part of admin cost						Vulnerable workers will be provided with personal protective equipment (PPE) to ensure their protection from dusts and fumes coming from the operation of vehicles and equipment. Employer shall ensure that provisions of DAO 2000-98 are followed.
	People: Strain on housing because of migration of people from other regions	No. of barracks provided for workers	counting	Annual	Construction site/stockyards	NIA PCO MMT	Part of admin cost						Proponent will provide housing facilities for workers.
	People: Contribution to traffic congestion along the access roads	No. of traffic accidents conducted	No. of trucks apprehended	As need arises	Along access roads from construction site to quarry areas	NIA Haulers/Con tractors LTMO	Part of admin cost						Since construction period involves the transport of big volume of construction materials and equipment, transport routes will be disrupted. Proponent will discuss with the LGU on best traffic implementation scheme in the area.
III. OPERATION PHASE													
Operation of the Irrigation System and maintenance of the dam, diversion	Noise: Increase in noise level caused by operation and movement of	Noise level	Noise meter	Quarterly	Baseline sampling stations for noise	NIA PCO MMT	P150,000						Construction activities particularly the movement of workers and heavy equipment should be confined within the boundaries of the project

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canal, road system and irrigation and drainage facilities	machineries, and the movements of workers											site. If possible, removal of trees and dense vegetation should be minimized.	
	1) Water Quality of Surface Water												
	1.1 Water Quality at Damsite. Monitor water quality of Jalaur & Ulian watershed to sustain suitability for freshwater fishery	water quality parameters for freshwater	physico-chemical parameters in situ and lab	per season	Sampling Site Station 1,2,3	PCO BFAR6	P8,000 station* 3 station / season* 2 season / yr = Php 48,000	EQPLs to be established at post-ECC	1.1 Water Quality at Damsite. Monitor water quality of Jalaur & Ulian watershed to sustain suitability for freshwater fishery	water quality parameters for freshwater	physico-chemical parameters in situ and lab		
	1.2 Damsite Siltation. Fast accumulation of sediment upstream of Diversion Dam due to heavy sediment loads of river	Total Suspended Solids (TSS)	Grab sampling; RA9275 lab analysis	monthly	Sampling Site Station 1,2,3	PCO NIA	P500/sample * 2 bottles/3 station/month * 12 month/yr = Php 36,000	EQPLs to be established at post-ECC	1.2 Damsite Siltation. Fast accumulation of sediment upstream of Diversion Dam due to heavy sediment loads of river	Total Suspended Solids (TSS)	Grab sampling; RA9275 lab analysis		
1.3 Maintenance of adequate dilution flows during the critical summer months to protect water quality in the Jalaur & Ulian Rivers.	water quality parameters for freshwater	gage reading	monthly	Damsite	PCO NIA	-	EQPLs to be established at post-ECC	1.3 Maintenance of adequate dilution flows during the critical summer months to protect water quality in the Jalaur & Ulian	water quality parameters for freshwater	gage reading			

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			Method	Frequency	Location			EQPL RANGE			MANAGEMENT MEASURE				
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									Rivers.						
	1.4 Water Quality at Service Area	water quality parameters for freshwater	physico-chemical parameters in situ and lab	per season	Sampling Site	PCO NIA	P10,000 / station* 4 station / season* 2 season / yr = Php 80,000	EQPLs to be established at post-ECC	1.4 Water Quality at Service Area	water quality parameters for freshwater	physico-chemical parameters in situ and lab				
	1.5 Introduction or increased incidence of waterborne or related diseases	color and turbidity	turbidimeter	as need arises	random sampling	PCO NIA	-	EQPLs to be established at post-ECC	1.5 Introduction or increased incidence of waterborne or related diseases	color and turbidity	turbidimeter				
	2) Local Benefits from the project	Project Benefits	Project Benefits	per season	Survey	PCO NIA	-	EQPLs to be established at post-ECC	2) Local Benefits from the project	Project Benefits	Project Benefits				
	Water: Siltation of creeks and rivers	Group 1: pH, temp, DO, conductivity, TSS, Oil and Grease, total coliform, fecal coliform Group 2: Heavy metals (Health significance and aesthetic quality)	Grab sampling	Group 1: Quarterly Group 2: Semi-annual	Baseline sampling stations for surface & ground water	NIA PCO MMT	P150,000					Proponent will construct siltation ponds to trap silt and sand with adequate retention time. The proponent will also implement vegetative measures to lessen the siltation of water bodies traversing the mine areas and those located downstream. Disturbance on creeks located inside three parcels will be minimized.			
	Water: Impact from grey water and sewage	pH, temp, DO, conductivity, TSS, Oil and Grease,	Grab sampling	Group 1: Quarterly Group 2:	Baseline sampling stations for	NIA PCO MMT	P150,000					Appropriate sanitation system to lessen the impact of human waste finding its			

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	from workers' quarters	total coliform, fecal coliform		Semi-annual	surface & ground water										way to water bodies. Sealed toilet with soak away pit will be ideal sanitation system. In case where there will be no water for toilet, ecological sanitation may be appropriate.
	Water: Flooding that will cause damage to equipment and endangering safety of workers.	pH, temp, DO, conductivity, TSS, Oil and Grease, total coliform, fecal coliform	Grab sampling	Group 1: Quarterly Group 2: Semi-annual	Baseline sampling stations for surface & ground water	NIA PCO MMT	P150,000								Construction of appropriate flood diversion structures. Orientation on emergency procedures for workers.
	People: Incidence of respiratory illnesses	Medical report	No. of medical check-ups	Annual	Project site	NIA Admin Officer Operations Manager	Part of admin cost								Proponent will provide personal protective equipment (PPE) for vulnerable workers. Proponent will also implement relative provisions on health for workers as indicated in DAO 2000-98. Proponent will establish clinic in the site to address emergency situations arising from mine operation.
	People: Impact of heavy equipments operation	Noise level	Noise meter	Quarterly	Mine sites	NIA PCO MGB	P150,000								Proponent will provide PPEs to operators and workers. Installation of mufflers for heavy equipments and trucks.
	People: Employment	No. of local workers hired	Counting	Annually	Project site	NIA Admin	Part of operation &								Through a Memorandum of Agreement (MOA) or

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								ALERT	ACTION	LIMIT	ALERT	ACTION	LIMIT	
						officer	admin cost							resolution from the LGU, proponent will prioritize hiring of qualified worker.
	People: Increase in traffic risks from the Quarry Site to Brgy. Roads to project site	No. of traffic accidents conducted	No. of trucks apprehended	As need arises	Along haul roads from project site to quarry area	NIA Haulers/ Contractors LTMO	Part of admin cost							Some of the measures to mitigate traffic problems include widening of barangay road, installation of lighting facilities along the road, restriction of hauling during day time only, installation of road signs, education of people from the barangay on road safety.
	Air: Increased emission of SO ₂ and NO ₂	SO ₂ and NO ₂	Sulfur Dioxide: Gas Bubbler and Pararosaniline Method or Flame Photometric Detector Nitrogen Dioxide - Gas Bubbler Griess-Saltzman, or Chemiluminescence Method	Quarterly	Baseline sampling stations for air	NIA Haulers/ Contractors PCO MMT	P150,000	Exceedance to DAO 2000-81			DAO 2000-81 guidelines			The proponent will ensure that all vehicles and heavy equipment will satisfy the regulatory requirements of government agencies with regards to compliance to the Clean Air Act (CAA).
	Water: Spillage of oil & grease	Volume of oil and grease	Pet Ether - Extraction Gravimetry	Daily	Motor pool Temporary storage area	NIA Haulers/ Contractors PCO MMT	P150,000							Proponent will ensure that storage areas for fuel and oil will satisfy basic requirements of EHS. Used oil will be properly stored and transported to accredited used oil

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			Method	Frequency	Location			EQPL RANGE			MANAGEMENT MEASURE						
								ALERT	ACTION	LIMIT	ALERT	ACTION	LIMIT				
																processors.	
	People: Incidence of respiratory illnesses	Medical report	No. of medical check-ups	Annually	Mine site	NIA Admin Officer Operations Manager	Part of admin cost										Vulnerable workers will be provided with personal protective equipment (PPE) to ensure their protection from dusts and fumes coming from the operation of vehicles and equipment.
	People: Potential accidents during use of vehicles and equipment	No. of reported accidents involving hauling contractors	Counting	Annually	Along haul roads	NIA Haulers/ Contractors											Central Safety and Health Committee will be created within the mining site to address emergency situations needing medical assistance.
	People: Generation of employment	No. of local people hired/employed by the project	Counting	Annually	Barangays	NIA Admin Officer Operations Manager	P 50,000										Through a Memorandum of Agreement (MOA) or resolution from the LGU, proponent will prioritize hiring of qualified worker...
	People: Generation of taxes & revenues	Amount of taxes paid	Counting	Annually	Host barangay	NIA Admin Officer Operations Manager	P 50,000										Prompt payment of taxes: Revenues to directly fund infrastructure, health and over-all wellbeing of the community in the directly impacted barangays.
	People: Potential accidents	No. of reported accidents involving hauling trucks by contractors	Counting	Annually	Haul roads	NIA Haulers/ Contractors	P150,000										Conduct trainings of workers on EHS & drills
I. ABANDONMENT PHASE																	
Rehabilitation of excavated areas	Land: Impact of not rehabilitating excavated areas	Exposed excavated area that needs rehabilitation	Estimation	Annually	Project site	NIA PCO MMT	P150,000										The proponent will undertake progressive rehabilitation of the project area.
	Water: Continuous	Group 1: pH, temp, DO, conductivity,	Grab sampling	Quarterly	Baseline sampling	NIA PCO	P150,000	Exceed-	ance to			DAO 96-					Environmental monitoring will be regularly conducted

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	contamination of water bodies	TSS, Oil and Grease, total coliform, fecal coliform Group 2: Heavy metals (Health significance and aesthetic quality)			stations for surface & groundwater	MMT		DAO 96-34		34	to evaluate the appropriate mitigating measures.		
	People: Increased unemployment	No. of workers dislocated/jobless as a result of project closure	counting	Annually	Project site	NIA Admin officer Operations Manager	Part of admin cost				The proponent will undertake bridge training for workers to prepare them on other livelihood skills for them to gain employment after the project completion. This is contained in the Social Development Framework, the thrust of which is to prepare the community to be self-reliant even after the project's closure.		