ENVIRONMENTAL MANAGEMENT FOR INFRASTRUCTURES AND ROADS (EMIR)
Province of Bohol, PHILIPPINES

PROJECT ENVIRONMENTAL ASSESSMENT REPORT

Project	**Provincial Road Maintenance Facility (PRMF)**
Implementing Partner	**Provincial Government of Bohol** (Hon. Edgar M. Chatto, Governor)
Project Name	**Rehabilitation of Jct. (LIR) Mahayag-Katipunan Rd (Alicia Side)**
Location	**Alicia, Bohol**
Duration	Approximately two (2) months
Project Description & Cost	Gravelling of 5.725 km earth section of existing earth Provincial Road with an estimated cost of Four Million Pesos (PhP4M). A detailed description of project activities is provided as **Attachment A**.

Certification: I, the undersigned, certify that:

1. The information in this form is correct and complete.

2. The following actions have been and will be taken to assure that the project complies with environmental requirements established under the Government of the Philippines.

Prepared by: Environmental Management for Infrastructure and Roads (EMIR) Team

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ATTACHMENT A

Project Environmental Assessment Report
Road Rehabilitation of Jct. (LIR) Mahayg – Katipunan Road (Alicia Side) Project
Re-gravelling, Raise Up and Widening

1.0 BASIC PROJECT INFORMATION

The proposed road rehabilitation project is located in Barangays Katipunan, Mahayag, San Isidro and Babag in the Municipalities of Alicia, San Miguel, Pilar and Dagohoy, respectively Province of Bohol. The existing 5.725 km length and 5.0 lm width of earth road ends Katipunan, Alicia. This road serves as a the main route of transport of local agricultural products of the Barangays of Katipunan, Mahayag, San Isidro and Babag and other influenced barangays in Boyles (Ubay), La Suerte and Estaca (Pilar) and provides access to goods and services available in the towns of Alicia, Pilar, Dagohoy, San Miguel and Ubay. Presently, the condition of the road section is poor and deteriorated with no proper drainage and during heavy rain, the road section is flooded, becomes muddy and slippery that pose risks to motorists and pedestrian. It has an average annual daily traffic of two hundred ninety one (291). The rehabilitation of the deteriorated earth road which is under the core road network of Management Unit II of the Provincial Engineer's Office (PEO) is urgently needed. Refer to **Annex A** Location/Vicinity Map including Vegetative Cover.

1.2 Rationale

The purpose of the project is to upgrade the deteriorated earth road section along existing route to an all-weather gravel road. The rehabilitation work will include embankment fill in selected sections, re-graveling, raise-up, widening and drainage structures without altering the existing hydrology of the surrounding area. The Provincial Government of Bohol will fund and implement the road upgrading. The PLGU will carry out regular road repair and maintenance, and implement recommended environmental measures when operational.

1.3 Expected Results

When completed, the rehabilitated road is expected to provide safe year-round access and enable local residents to transport produce and avail of goods and services in the town proper of Alicia and its neighboring municipalities. It is anticipated that the road improvement will generate substantial savings in transport costs and vehicle operating costs, increase net value added of farm produce, and create incentives for local economic activities. In the long-term, the project is envisioned to help improve the living and economic conditions in Barangays Katipunan, Mahayag, San Isidro, Babag and Boyles.

2.0 PROJECT ACTIVITY DESCRIPTION

Project Components

The road rehabilitation project will be implemented according to the DPWH Standard Specifications for Highways and Bridges (2004), and Special Provisions and Supplementary Specifications for the project. The project is the Rehabilitation of Junction Loay-Interior-Road at Mahayag to Katipunan Road situated on Alicia side. It is classified as a Core Road. Embankment materials, surfacing materials and other road accessories are the needed materials for the project. The scope of work has specific activities namely: pre-construction, construction and post-construction phases**.** The project component activities are described in **Table 1.**

Table 1. Project Component Activities

Project Phases	Activity Description and Assigned Responsibilities	Responsible Parties
Pre-Construction Phase	Technical and engineering, social and environmental data are available for the preparation of Site Development Plan for the road rehabilitation project. Refer to **Annex B** for the SDP and Site Photos.	BEMO PEO
	Conducted public consultation with local residents, officials, and including representative from women's group (**Annex C-** Attendance Sheet and Photos).	PLGU
	Confirm ROW prior to the start of construction (**Annex D –** Certification). Take responsibility for security, information dissemination, and securing of necessary government permits prior to the start of construction.	PLGU
Construction Phase	Supervise the contractor and monitor construction work to ensure compliance with contractual obligations.	PEO
	Carry out the scope of work for the road upgrading consisting of: • Widening of narrow road sections to more than 5.0 lm width carriageway prior to graveling or laying of sub-base materials; • Embankment fill to raise the road elevation above the existing ground level, as deemed necessary; • Installation of canals, cross-drain and side slope protection on identified locations along the roadway, if applicable.	PEO Contractor
	Carry out any clean up and restoration works at the construction area prior to demobilization.	Contractor
Operation and Maintenance	Operate the facility properly, provide necessary repair and maintenance works, and allocate adequate funds and personnel for implementation.	PEO

Implementation Schedule and Funding	The construction work will be approximately completed within two (2) months from mobilization with an estimated total cost of Four Million Pesos (P4M) to be funded under the Provincial Roads Management Facility. Skilled and unskilled workers, local hired labor, including women will be utilized during the pre-during and post construction works.	PEO Contractor

3.0 ENVIRONMENTAL BASELINE INFORMATION

Table 3 presents baseline environmental information to characterize the existing condition at the general location of the project site prior to implementation.

Table 3. Baseline Environmental Information

Site Location Characteristics	Environmental Parameters	Recorded and Reported Information
Geographic Location	Latitude	124^{o} 22.683' E
	Longitude	9 ^{o} 52.647.6' N
Local Topography	Terrain/Slope	The road section below the rice-field is of flat terrain and partly rolling
	Elevation	131.8 to 144.1 m AMSL
Local Geology	Soil Type	Alicia has four (4) known soil types, namely: Ubay clay, Faraon clay, Candijay Clay and rough stone land. The most dominant type is Ubay clay which occupies 7,802.03 hectares or about 68.14% of the total land areas. Faraon clay constitutes 2,158.32 hectares or 18.85%; Candijay clay occupies 1,095.76 hectares or 9.57% and Rough stone land occupies 393.88 hectares or 3.44% of the total land area. (CLUP-Alicia, p. 7)

	Minerals	The municipality is covered by five (5) rock formations, namely: Carmen Rock Formation (Mc), Alicia Schist (Pta), Sierra Bullunoes Limestone (Msb), Boctol Serpentine (Ptb) and Ubay Volcanics (Ptu). Carmen formation covers 5,288.56 hectares or 55.11% of the total and area. the name of the formation nis derived form Carmen town in the central part of Bohol where the type section is best exposed. It is essentially composed of shale, sandstone, slabby to elastic limestone beds, conglomerare, siltstone, mudstone and marl. Generally the sedimentary beds are low dipping and inter-bedded with each other and assume a highly tuffacious nature. The base of the Carmen formation is a thin, medium-grained particles of feldspars, glass shards, sharply angular glass and fragments of hexaltic horn bleeds. In between shale beds are thin sandy tuffaceous stringers of volcanic ash and other pyroclastics. A period of erogeny during the early Carmen time may have affected the complex structural behavior of the base of the formation. The thickness of the exposure is difficult to determine. (CLUP-Alicia p. 5)
Local Hydrology	Rivers/ Creeks	The municipality is traversed by 4 major rivers, namely: Malitbog River, Bagasiko River, Napo River and Cabatang River divides the boundary between Pilar and Alicia and stretches a total length of 1.75 kilometers from its origin starting from the southwestern portion between Barangays Cagongcagong and Katipunan ending at the western portion boundary between Katipunan and Alicia. Bagasiko River starting from La Hacienda traverses Untaga Poblacion and Progreso converging with the Cabatang River stretching to about 2.25 kilometers. This is known o be the longer river in Alicia. Both Cabatang and Napo Rivers stretches to about 2 kilometers. The Tugasan Creek originates at the northwestern portion of La Hacienda towards the northern end portion of Cabatang stretching to a total length of 1.75 kilometers. This serves as the boundary between Alicia and Ubay. There are 8 known springs located in Putlongcam, Mahayag, La Hacienda, Progreso, Cabatang, Cayacay, Sudlon ang Napo. (CLUP Alicia, p. 7)

	Present Use	Agriculture including inland fisheries and Domestic Use Safe and potable water is an essential requirement for a healthy population and therefore ranks high in the priority of infrastructure needs of the municipality. The Level II water supply in the Poblacion and partly in Del Monte, Sudlon and Putlongcam is supplied from a spring in sitio Puti that is brought to the service area by gravity. (CLUP Alicia, p. 41)
	Sensitive habitats/species	None within 6 km radius from the project site
Local Climate	Climate type	Like the rest of Bohol, the climate of the municipality of Alicia is classified as Type IV under the Corona Classification which is characterized by evenly distributed rainfall throughout the year. Alicia is generally out of the typhoon belt and seldom experiences severe weather disturbances. The municipality as well as the entire island of Bohol is generally sheltered from the effects of most air masses from adjacent islands. (CLUP Alicia, p. 4)
	Annual Rainfall	The average annual rainfall as transposed from the neighboring stations is about 2,074 mm/year per sqm. The average annual municipal rainfall is the sum of the average annual rainfall from their respective river basin multiplied by the percentage of the municipal area within the river basin. Monthly rainfall within the year differs in varying degrees. The months from July to December a re usually rainy months, while the months of January to June are the dry months. The prevailing winds come from the north. (CLUP Alicia, p. 4)
Natural	Earthquakes/Volcanic	No reported of past occurrences

Physical Hazards	Landslide/Erosion	The areas that are not susceptible to erosion dominate the entire municipality. These areas are characterized by the slopes which are level to nearly level wherein the drainage capacity of the soil offsets the erosion potential. this occupies a land area of 6,330.71 hectares or 55.29% of the total land area. Areas which are highly susceptible to erosion could be well observed on the northeastern and southwestern portion of the municipality. This constitutes about 4,544.51 hectares or 39.69% of the total land area of Alicia. These areas are characterized by an abrupt rise in elevation with slopes of over 8%. Areas moderately susceptible to erosion most likely occur in areas where slopes are characterized to be nearly elevated which also depends on the type of soil present. This can be observed in the northern portion of the municipality particularly in Untaga, Cabatang and Progreso. This occupies 574.79 hectares or 5.02% of the total land area. (CLUP Alicia, p. 7-8) The project area (Katipunan) has none to low in terms of its susceptibility to landslide and flooding (MGB Geo-hazard Summary)
	Flooding	The soil types of Alicia have high capacity to drain water from the rain, thus the municipality is not prone to flooding and any hazards attendant to floods. On certain occasions, however, portions of the Poblacion and Napo experience flooding particularly the eastern part when the Cabatang River overflows. Approximately 420.21 hectares or 3.67% of the total land areas will be most likely affected when flooding happens. (CLUP Alicia, p. 7)
Forest/ Vegetation Cover	Type	Forest/Agricultural (coconut, rice, corn, fruits, vegetables, pasture grasses, native and exotic tree species, banana, mangoes, rootcrops) and other non-forest products, like bamboos, rattan

	Coverage area	The forest is an important natural resource that provides a wide range of benefits to the community even as in the case of Alicia, it only consists mostly of pastureland. It has been and continues to be subjected to numerous conflicting uses that include food production, human settlements and a variety of economic activities or a combination of the above. This has resulted in accelerated soil erosion, siltation of rivers and waterways, shortages of wood and other forest products and the destruction of plant and animal habitats. (CLUP Alicia, p. 24)
Protected Areas	Forest/Timberland	The municipality has a relatively small timberland area of 407 hectares representing 3.5% of its total land area which can be found in 4 of the 15 barangays: Cagongcagong (71 hectares); Del Monte (109 hectares); Mahayag (128 hectares); Sudlon (99 hectares) (CLUP Alicia, p.78) The Municipality of Alicia is within the Carood Watershed.
	Coastal/Inland Waters	None
Land Area and Existing Land Use	Land Area (ha)	11,450 hectares (CLUP Alicia, p.77)
	Land Classification & Use	The municipality has 11,450 hectares. 11,043 hectares or 96.45% are classified as Alienable and Disposable Land, while 407 hectares or 3.55% are classified as Timberland Area. (CLUP, Alicia, p. 77). The existing general land use pattern of the Municipality of Alicia is typical of Philippine rural communities. Predominantly agricultural, the settlements are widely dispersed and scattered. Houses are constructed along the road and in the middle of their farms, which makes it difficult to introduce basic facilities and services. There are areas, however where the concentration of settlements is located near their sources of livelihood. (CLUP Alicia, p. 83)
Population (Latest Census Data)	Total Population	4th Class municipality with 23,422 people as of 2007 census in 14 barangays (nso.gov.ph)
	Total Households	4,065 HH with an average HH size of 5.31 persons
	Ethnic Group (%)	100% Boholanos
	Est. Total Beneficiaries	Four (4) Target Barangays with a total 2012 projected population of 8,926: Katipunan, Alicia (2,738); Mahayag, San Miguel (2,738); San Isidro, Pilar (2,543) and Babag, Dagohoy (1,319)

Local Economy	Total Labor force	7,037
	Main Income source	**Farming / Agriculture**
Basic Services and Infrastructures	Water supply	Level 3 water system 310 HH population served; Level II water system 1,671 HH population served; Level I water system: 75 shallow wells serving 5,683 HH, 20 deep wells serving 2,296 HH and 101 improved springs serving 19,146 HH. (CLUP Alicia, p. 41-42)
	Sanitary toilets	53 HH with water sealed toilets; 3,102 water-sealed/other depository used exclusively by the household; 76 closed pit (Antipolo type) toilet; 187 open pit toiler and 201 without sanitary latrines. (CLUP Alicia, p. 59)
	Electricity	14 Barangays have access to electricity provided by BOHECO II.
	Transportation	The growing demands for well-maintained farm-to-market roads have not been adequately responded; road maintenance of existing roads had been poor and access to and from these areas have slightly improved. The municipality has satisfied the standard of 1 kilometer per square kilometer of land area since it has a total road length of 128.02 which the standard would only require 114.5 kilometers. There are 11 bridges in the municipality with a total of 325.6 lm: (National 7; Provincial 1; Barangay 3).
	Communication	1. Telephone: The municipality has two Public Calling Office (PCO); Islacom/Globelines provides household connections in the Poblation area; Cellular Phones provided by SMART, GLOBE and Sun Cellular 2. Telegraph – Telecommunications Office (TelOff) 3. Postal Service 4. Portable radio transceivers 5. Broadcast media 6. Print media 7. BLECS (CLUP Alicia, pp. 31-33)
	Education	The municipality has 2 Primary Schools; 12 elementary schools out of 14 barangays and 2 secondary schools. (CLUP Alicia, p. 46).

	Health	The municipality has adequate health facilities and personnel to attend to health needs of its populace. It has 5 Barangay Health Stations, Municipal Health Office and the Alicia Municipal Hospital. (CLUP Alicia pp. 56-57)
	Social Welfare	There are 15 Day Care Centers and 15 Social Welfare Officers out of 14 barangays with registration services; Senior Citizens Center; Municipal Social Welfare and Development Office and Provincial Social Welfare and Development Officer Social Welfare services include Family Life Education and Counseling, Family Planning Assistance, Day Care Services, Supplemental Feeding, Medical Care, Relief/Rehabilitation, Senior Citizens Care. (CLUP Alicia, p. 66)
	Religious Buildings	Catholic Church (1) located at the Poblacion area
	Police/Fire Protection	There are 15 policemen currently stations in Alicia with a police to population ratio of !:1,335. There is also a Military outpost located at La Hacienda, Alicia. There are also Barangay Tanods in the 14 Barangays of the municipality. No Fire Station in Alicia.

4.0 EVALUATION OF PROJECT ISSUES WITH RESPECT TO POTENTIAL ENVIRONMENTAL IMPACT

Table 4 presents the Environmental Impact Screening Matrix for the proposed road rehabilitation project. No significant adverse environmental impacts have been identified and determined to arise during project implementation.

There is a portion of the road section that would require cutting of a few planted trees. Considering that the road section is generally flat, some rice fields will be affected by the road widening and raise up processes, thus road design should consider adjustments especially in the embankment. The purpose of the road rehabilitation project will have to be communicated effectively to the barangay officials and residents of the affected areas to gain support. Only few houses in the area have bamboo fences that will be affected in the project.

Table 4. Environmental Impact Screening Matrix

Project Activities	Potential Environmental Issues and Concerns Arising from Project Activities	None or Insignificant Impact	Significant Impact			Duration of Impact	
			Low	Mod	High	Short term	Long-term
Pre-construction Stage	Affect existing forested area	✔					
	Require tree cutting or vegetation clearing		✔			✔	
	Remove permanent structures of value	✔					
	Damage cultural and historic resources	✔					
	Impair local aesthetic or scenic resources	✔					
	Require additional land for ROW acquisition	✔					
	Cause relocation and resettlement	✔					
	Damage present local service facilities	✔					
	Damage to properties or belongings	✔					
	Impose additional demand on local services	✔					
	Restrict public access to the area	✔					
	Pose human health and safety hazards	✔					
	Create job opportunities/local hired labor	✔					

Project Activities	Potential Environmental Issues and Concerns Arising from Project Activities	None or Insignificant Impact	Significant Impact			Duration of Impact	
			Low	Mod	High	Short term	Long-term
Construction Stage	Generate excess excavation materials		✔			✔	
	Generate construction wastes and debris		✔			✔	
	Generate wash/wastewater/runoff	✔					
	Induce topsoil erosion/deposition	✔					
	Create nuisance noise, dust and vibrations		✔			✔	
	Pose human health and safety hazards		✔			✔	
	Impose additional demand for local services		✔			✔	
	Affect pedestrian/vehicular traffic flow			✔		✔	
	Create increased demand for aggregates			✔		✔	
	Create job opportunities/local hired labor			+		✔	
Post-Construction & Operation Stage	Increase demand for water and power services		✔				✔
	Increase demand for waste disposal			✔		✔	
	Increase demand for drainage/sewerage		✔			✔	
	Increase demand for traffic protection/control			✔			✔
	Increase health and safety hazards			✔			✔
	Create income and livelihood opportunities				+		✔
	Improve delivery of goods and services				+		✔
	Contribute to effective land use & development				+		✔
	Promote/ support in peace development				+		✔

Note: + means potential beneficial impact

5.0 ENVIRONMENTAL MANAGEMENT PLAN (Recommended Mitigation, Monitoring and Evaluation Measures)

The Environmental Management Plan (EMP) shown in **Table 5** is prepared to guide implementation of recommended impact mitigation and monitoring measures by the responsible persons or agency to assure satisfactory compliance of the plan.

Table 5: Environmental Impacts Management Plan

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Magnitude (Slight, Moderate, Severe)	Time Frame (Short, Medium, Long)	Affected Road Section	Affected Area Outside of the Road Section	Prevention / Mitigation or Enhancement Measures	Recommendations
Pre-construction								
Land	Mobilization of contracted physical works; Road works preparation	Clearing and grubbing of trees and other vegetation.	Slight	Short	Bunkhouse	None	Surveyors must preserve and protect all existing vegetation in the area. Site clearing, if necessary, must be regulated and minimized. Proper protocols of surveying must be observed. Re-vegetation required.	• Identify area for clearing • Tree Inventory
		Disturbances and damages to public and private lands and associated properties.	Slight	Short	Portion of the road section	None	Allocate funds for damages	• Coordinate with the affected land owner. • Enter into agreement and settlement
		Vehicular traffic disturbances.	Slight	Short	Entire road section	None	Assign flagman	• Installing of signage and traffic route. • Re-routing of traffic or using one lane.
		Uncovered or unrelated Auger borings and test pits.	Slight	Short	Selected section	None	Holes and borings must be properly replaced;	• Replace materials on test pits after boring
Air		Depletion of air quality	Slight	Short	Entire road section	None	Deployment of good-conditioned vehicles and equipment.	• Conduct community awareness • Provision of PPE ex.

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Magnitude (Slight, Moderate, Severe)	Time Frame (Short, Medium, Long)	Affected Road Section	Affected Area Outside of the Road Section	Prevention / Mitigation or Enhancement Measures	Recommendations
							Regular check up of vehicles and equipment conditions.	mask
		Air pollution/increase of noise in the area.	Slight	Short	Entire road section	Immediate neighboring areas	Limit loud and vibratory activities only during the daytime. Use mufflers and sound insulators. Deployment of well maintained vehicles and equipment.	• Conduct community awareness
Water		Increase usage and competition of domestic water resources.	Slight	Short	Entire road section	None	Controlled use of local water.	• Conduct community awareness
		Generation of domestic wastes that reduce water quality, potential for bacterial diseases.	Slight	Short	Entire road section	None	Right management of liquid and solid wastes in work camps. Proper implementation of waste segregation and immediate disposal of putrescible and domestic wastes	• Identify dumping area for waste disposal and segregation • IEC
People	Roadworks	In-migration of construction workers	Slight	Short			Provide opportunities for employment	Priority for local labor
Construction								
Land	Clearing and grubbing	Disturbance of flora and fauna	Moderate	Medium	Entire road section	None	• Limit activity only within road right of way. • Re-vegetation, replacement or replanting of trees.	• Strictly adhere to the road design • Replacement of trees cut on designated area (1 tree cut

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Magnitude (Slight, Moderate, Severe)	Time Frame (Short, Medium, Long)	Affected Road Section	Affected Area Outside of the Road Section	Prevention / Mitigation or Enhancement Measures	Recommendations
								replaced with 10 trees planted in a designated area using indigenous species) • Identify dumping area of uprooted vegetation. • Cut trees should be at the disposal of the owner.
		Generation of construction wastes	Moderate	Medium	Entire road section	None	• Solid waste management plan to include waste segregation, recycling and reuse of generated wastes. • Proper coordination with LGU on the proper disposal of generated construction wastes	• Construct waste disposal facility • Identify site with LGU on disposal
		Generation of spoils	Moderate	Medium	Entire road section	None	All excess soil generated by the project will be reused or disposed at designated disposal sites.	• Identify excess soil disposal site
	Quarry/borrow pit for road aggregates.	Depletion of mineral resources	Moderate	Medium	Identified site	Quarry areas	Selection of suitable intermediate borrow pit nearer to works if possible.	• Borrow pit for road aggregates must be from a permitted area as recommended by BEMO

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Magnitude (Slight, Moderate, Severe)	Time Frame (Short, Medium, Long)	Affected Road Section	Affected Area Outside of the Road Section	Prevention / Mitigation or Enhancement Measures	Recommendations
	Earthworks and gravel road construction	Soil quality degradation	Slight	Short	Selected section	None	Scrapped productive top soil be returned to sustain soil fertility/productivity in the nearby areas	
		Terrestrial ecosystem temporary disruption	Slight	Short	Selected section	None	Replacement or re-planting of tree and other vegetation	• Tree planting on identified site
		Potential for elevated erosion	Slight	Short	Selected section	Immediate area of the project site	Strictly follow sound design requirements and specifications like stabilization of slopes. Minimize ground disturbance and always consider local climate and inclement weather. Soil compaction in excavated areas (i.e. culverts, drainages) Provision of biological soil erosion control measures	• Install slope protection • Install drainage and pipe culverts • Construct line canal • Planting of vetiver plant
		Unmanaged road spills of hydrocarbons from diesel generators, fuel storage tanks, and from maintenance of vehicles and equipment.	Moderate	Medium	Entire road section	None	Appropriate management of petroleum (e.g. fuels, oil and lubricants) products handling and vehicles maintenance.	• Preventive maintenance of equipment

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Magnitude (Slight, Moderate, Severe)	Time Frame (Short, Medium, Long)	Affected Road Section	Affected Area Outside of the Road Section	Prevention / Mitigation or Enhancement Measures	Recommendations
Air	Loading, transport and unloading of construction materials and aggregates; Construction of facilities	Air Pollution due to Increase in total suspended particles (TSP)	Moderate	Medium	Entire road section	Immediate vicinity of the project site	Use of tarpaulin covers for delivery trucks.	• Community information and monitoring
	Earthworks and gravel road construction	Air Pollution due to increased emission of TSP, SOx and NOx.	Moderate	Medium	Entire road section	None	Regular water spraying on aggregate piles and exposed areas. Regular watering of construction site when needed. Proper operation and regular engine maintenance.	• Community information
		Noise Pollution due to increase of noise in the area.	Moderate	Medium	Entire road section	None	Limit loud and vibratory activities only during the daytime. Use mufflers and sound insulators. Proper operation and regular engine maintenance.	• Community information
Water	Loading, transport and unloading of construction materials and aggregates;	Siltation of drainage line and water body due to washed aggregates	Slight	Short	Entire road section	Nearby water sources	Proper stockpiling of aggregates. Build perimeter fence to shield the construction area from outsiders	• Installation of signages

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Magnitude (Slight, Moderate, Severe)	Time Frame (Short, Medium, Long)	Affected Road Section	Affected Area Outside of the Road Section	Prevention / Mitigation or Enhancement Measures	Recommendations
	Construction of facilities and work camps.							
	Earthworks and gravel road construction	Unmanaged road spills of hydrocarbons from diesel generators, fuel storage tanks, and from maintenance of vehicles and equipment.	Slight	Short	Entire road section	None	Appropriate management of petroleum (e.g. fuels, oil and lubricants) products handling and vehicles maintenance.	• Contractor to formulate Operational Control Procedure on Vehicle Maintenance so as to prevent water pollution in the surrounding area of the project site
		Potential soil and water contamination with impacts on ecosystem and people	Slight	Short	Entire road section	None	Strictly observe and implement road design and implementation of liquid waste management	• Close monitoring of road works
		Potential for water blockage or drainage issues; potential for erosion; surface water impacts from sediments	Slight	Short	Portion of the section	Near rice field areas	Follow appropriate construction guidelines and install culverts/drains as required to cater for surface water flows.	Proper embankment
		River siltation and surface water quality impacts from sediments.	Slight	Short	Portion of the section	Near a creek	Provision of silt traps structures.	Monitoring of silt contamination in rivers and creeks

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Magnitude (Slight, Moderate, Severe)	Time Frame (Short, Medium, Long)	Affected Road Section	Affected Area Outside of the Road Section	Prevention / Mitigation or Enhancement Measures	Recommendations
		Failure to use and apply material correctly could potentially cause erosion and surface water impacts from sediments.	Slight	Short	Entire road section	None	Construct pavement using sub-base course, base course, and wearing course placed in layers, shaped to profiles and compacted using selected materials in accordance with the engineering design standards and specifications.	Identify erosion problem areas along the road section and mark appropriately
		Failure to construct suitable roadside drainage ditches can result in erosion as well as impacts on drinking water quality and nearby riverine ecosystems	Slight	Short	Portion of the section	Malitbog River near Katipunan	Form roadside drains comprising earth ditches with drains comprising earth ditches with selected sections lined as appropriate to prevent erosion, in accordance with the engineering design standards and specifications.	Identify erosion problem areas along the road section and mark appropriately
People	Mobilization of contracted physical works; Road works preparation; and Construction of facilities.	In-migration of construction workers, personnel and other migrants. Probable disorder.	Slight	Short	Entire road section	None	Provide opportunities for employment or livelihood. Observe peace and order. Maintain good working relation between workers and local residents.	Hire local laborere
		Sanitation - Generation of domestic wastes and reduced water quality, potential for	Slight	Short	Entire road section	None	Right management of liquid and solid wastes in work camps. Proper implementation of waste segregation and immediate disposal of putrescible and domestic waste in coordination	• Contactor to establish proper disposal of liquid and solid waste at work camps.

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Magnitude (Slight, Moderate, Severe)	Time Frame (Short, Medium, Long)	Affected Road Section	Affected Area Outside of the Road Section	Prevention / Mitigation or Enhancement Measures	Recommendations
		bacterial diseases					with the MLGUs	• Construct latrines for stay in workers. • Bacteriological testing of drinking water
	Hiring of local fit-to-work construction workers	Increase of local employment and improve local economy.	Moderate	Medium	Entire road section	Other influenced barangays	Local employment is recommended to maximize benefits to the community. Priority of hiring to be given to qualified residents of the hosts and nearby barangays.	Post appropriate manpower hiring notice on time
	Use of heavy equipment and vehicles during hauling and construction.	Health impacts - possible incidences of respiratory illnesses.	Slight	Short	Entire road section	None	Ensure protection of workers and residents from dusts coming from the operation of vehicles and equipment (e.g. use of personal protective equipment)	Provide PPEs and orient workers on the health risk associated with the work
	Earthworks and gravel road construction	Potential accidents of workers	Slight	Short	Entire road section	None	Adopt appropriate safety measures; provide first-aid services; and make workers aware of risks and how to avoid them.	• Workers provided with PPEs • Conduct Work Safety Orientation
							Coordinate with nearest hospital and concerned government agency for emergency medical response and rescue operations	• Emergency vehicle on stand-by • Emergency Numbers posted at the work camps
		Disruption of road traffic	Slight	Short	Entire road section	None	Rerouting traffic and installation of road traffic signages	• Assign flagmen to direct traffic

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Magnitude (Slight, Moderate, Severe)	Time Frame (Short, Medium, Long)	Affected Road Section	Affected Area Outside of the Road Section	Prevention / Mitigation or Enhancement Measures	Recommendations
Abandonment								
Land, Air, Water and People	General clean up of the work staging areas, from temporary structures, unserviceable equipment, formworks, used oils, lubricants and sanitation facilities.	Erosion, increase in bacterial insect-borne disease from waste and others due to failure to rehabilitate work-site, including borrow areas and work camps	Moderate	Medium	Entire road section and Bunkhouse	Depository areas for excess materials	Works Specification and Conditions of Contract. Ensure work camp is removed/rehabilitated in accordance with DPWH guidelines.	Conduct final inspection of the work camp and staging areas
	Continued monitoring, auditing and appropriate resourcing	Decline in road quality and resultant impacts across the range of issues due to failure to continue with established practices, monitoring and auditing.	Moderate	Long	Entire road section	Other surrounding areas influenced by the project	Budget set aside for monitoring and EMoP in place.	• Conduct regular EMP Monitoring as scheduled. • Leveling and compilation of lessons learned. • Establish the Adopt a Road Program.

Table 6: Environmental Monitoring Plan (EMoP)

Responsible Entity : Provincial Engineer's Office
Name of the Contractor:

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Prevention / Mitigation or Enhancement Measures	Parameters to be Monitored	Road Section	Recommendations
Pre-construction						
Land	Mobilization of contracted physical works; Road works preparation	Clearing and grubbing of trees and other vegetation. Disturbances and damages to public and private lands and associated properties. Vehicular traffic disturbances. Uncovered Auger borings and test pits.	Surveyors must preserve and protect all existing vegetation in the area. Site clearing, if necessary, must be regulated and minimized. Proper protocols of surveying must be observed. Holes and borings must be properly replaced; Re-vegetation.	Design specifications; Integrity of existing vegetations in the proposed project Bore holes	Whole section of the road	Replanting of affected/cleared trees (1 tree cut replaced with 10 trees planted
Air		Depletion of air quality	Deployment of good-conditioned vehicles and equipment. Regular check up of vehicles and equipment' conditions.	Air quality; Condition of vehicle	Entire road section	Get emission test results of heavy equipment
		Increase of noise in the area.	Limit loud and vibratory activities only during the daytime. Use mufflers and sound insulators. Deployment of well maintained vehicles and equipment.	Noise level; Vibration	Entire road section	Daytime operation only and using of mufflers and other sound insulators
Water		Increase usage and competition of domestic water resources.	Water conservation measures	Water usage		Encourage use of rain water
		Generation of domestic waste that reduce water quality, potential for bacterial diseases.	Right management of liquid and solid wastes in work camps. Proper implementation of waste segregation and immediate disposal	Solid and liquid waste generated		Implement waste segregation

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Prevention / Mitigation or Enhancement Measures	Parameters to be Monitored	Road Section	Recommendations
			of putrescible and domestic wastes			
People		Involuntary resettlement issues for Project Affected Persons (PAPs)	The proponent shall establish in their final survey the PAPs that will be affected by the project. Corresponding mechanism for payment shall be done based on Philippine laws.	Presence of PAPs along road right of way		Inventory of PAPs Inform the officers and members of the Carood Watershed Management Council of the project
Construction						
Land	Clearing and grubbing	Disturbance of flora and fauna	Limit activity only within road right of way.	Magnitude of affected area Species affected	Indicate road section that will be affected	Consider re-design alignment of road section to minimize impacts of clearing and grubbing
			Re-vegetation, replacement or replanting of affected trees	Number of trees affected and planted	Indicate road section that will be affected	Replacement planting of affected trees 1 tree cut:10 trees replanted using indigenous tree species Identification of planting sites and number of trees to be planted
		Generation of construction wastes	Solid waste management plan to include waste segregation, recycling and reuse of generated wastes.	solid waste generated		Implement requirements of RA 9003 Cut trees will be at the disposal of the owner
			Proper coordination with the concerned LGUs on the proper disposal of generated construction	Solid Waste Management practices	Entire road section	Refer to ESWM Plan of the LGU

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Prevention / Mitigation or Enhancement Measures	Parameters to be Monitored	Road Section	Recommendations
			waste			
		Generation of spoils	All excess soil generated by the project will be reused or disposed at designated disposal sites.	Volume of excess soil or spoils	Road section	Use excess soil as embankment material
	Quarry/borrow pit for road aggregates.	Depletion of mineral resources/ Insufficient quarry/borrow pits to provide aggregate	Selection of suitable intermediate borrow pit nearer to works if possible.	Location of quarry areas Volume of quarry materials needed	Road section	Comply with the provisions of the Provincial Ordinance No 2008-025 (Provincial Mining Ordinance)
		Depletion of mineral resources/unlicensed quarry site.	Identify, secure, and comply with all permitting requirements.	Quarry permit either from PLGU (equal or less than 5 hectares) or Mines and Geosciences Bureau (more than 5 hectares)	Entire road section	Check with BEMO on the permitted quarry sites near the project area
	Earthworks and gravel road construction	Soil quality degradation	Scrapped productive top soil be returned to sustain soil fertility/productivity	Volume of scrapped top soil	Entire road section	Deposit top soil in a designated area for future use
		Terrestrial ecosystem temporary disruption	Replacement or re-planting of tree and other vegetation	Number of trees affected by the project	Portion of the road section	Replacement planting 1 tree cut: 10 trees replaced and planted in a designated area
		Potential for elevated soil erosion in the project site and nearby rice field areas	Strictly follow sound design requirements and specifications like stabilization of slopes.	Soil erosion in the project site and nearby rice field areas		Implement soil stabilization techniques
			Minimize ground disturbance and always consider local climate and inclement weather.			
			Soil compaction in excavated areas			Use appropriate culvert size

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Prevention / Mitigation or Enhancement Measures	Parameters to be Monitored	Road Section	Recommendations
			(i.e. culverts, drainages).			
			Provision of biological soil erosion control measures			Planting of soil stabilization grasses like vetiver grass
		Soil contamination due to unmanaged road spills of hydrocarbons from diesel generators, fuel storage tanks, and from maintenance of vehicles and equipment.	Appropriate management of petroleum (e.g. fuels, oil and lubricants) products handling and vehicles maintenance.	Presence of road spills from vehicles and volume of spills		Implement safety standards to avoid oil and fuel spillages Formulate and implement Operational Control Procedures
Air	Loading, transport and unloading of construction materials and aggregates; Construction of facilities	Air pollution due to Increase in total suspended particles (TSP)	Use of tarpaulin covers for delivery trucks.	TSP level		Delivery trucks must at all times be covered when hauling materials
	Earthworks and gravel road construction	Air pollution due to Increased emission of TSP, SOx and NOx.	Regular water spraying on aggregate piles and exposed areas.	Exhaust level from vehicles	Entire road project length/section	Regular water spraying if necessary
			Regular watering of construction site when needed. Proper operation and regular engine maintenance.	TSP level		Regular water spraying of the affected area
		Noise Pollution due to increase of noise in the area.	Limit loud and vibratory activities only during the daytime. Use mufflers and sound insulators.	Noise level; Vibration		use of mufflers and sound insulators operate during the day only
			Proper operation and regular engine maintenance.			Proper engine maintenance

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Prevention / Mitigation or Enhancement Measures	Parameters to be Monitored	Road Section	Recommendations
Water	Loading, transport and unloading of construction materials and aggregates; Construction of facilities and work camps.	Siltation of drainage line and water body due to washed aggregate resulting from inclement weather	Proper stockpiling of aggregates. Build perimeter fence to shield the construction area from the outside.	Stockpile in designated area		Build perimeter fence around the stockyard
	Earthworks and gravel road construction	Water pollution impacts on ecosystem and people due to unmanaged road spills of hydrocarbons from diesel generators, fuel storage tanks, and from maintenance of vehicles and equipment.	Appropriate management of petroleum (e.g. fuels, oil and lubricants) products handling and vehicles maintenance.	Presence of road spills from vehicles Volume of spills		Implement proper fuel and oil management to avoid spillage like operational control procedure in the management of fuel and oil
		Potential for water blockage or drainage issues; potential for erosion; surface water impacts from sediment	Follow appropriate construction guidelines and install culverts/drains as required to cater for surface water flows.	Presence of sediments in waterways	Indicate section	Installation of appropriate size of culvert
		River siltation and adverse surface water impacts from sediments.	Provision of silt traps structures. Regular monitoring of silt contamination in rivers and creeks	Presence of sediments in waterways	Portion of the road section	Implement silt control/silt traps
		Soil Erosion and surface water impacts from sediments due to failure to use and apply material correctly.	Construct pavement using sub-base course, base course, and wearing course placed in layers, shaped to profiles and compacted using selected materials in accordance with the engineering design standards and specifications.	Presence and volume of sediments in waterways	Portion of the road near Malitbog river	Implement sound engineering practices, like construction of pavement using sub-base course, base course, etc.

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Prevention / Mitigation or Enhancement Measures	Parameters to be Monitored	Road Section	Recommendations
		Failure to construct suitable roadside drainage ditches can result in erosion in a steeply sloping region, as well as impacts on drinking water quality and riverine ecosystems	Form roadside drains comprising earth ditches with drains comprising earth ditches with selected sections lined as appropriate to prevent erosion, in accordance with the engineering design standards and specifications.	Presence and volume of sediments in waterways		Construct suitable road side drainage in accordance with the engineering design
People	Mobilization of contracted physical works; Road works preparation; and Construction of facilities.	In-migration of construction workers, personnel and other migrants. Peace and Order problems	Provide opportunities for employment or livelihood. Observe peace and order. Maintain good working relation between workers and local residents.	Number of local residents employed in the project	Entire road section	Employ local labourers to include women
		Sanitation - Generation of domestic wastes and reduced water quality, potential for bacterial diseases	Right management of liquid and solid wastes in work camps. Proper implementation of waste segregation and immediate disposal of putrescible and domestic wastes.	Presence and volume of solid and liquid wastes		Proper solid and liquid waste management: RA 9003 and RA 6969 requirements
	Hiring of local fit-to-work construction workers	Increase of local employment and improve local economy.	Local employment is recommended to maximize benefits to the community.	Number of local residents employed in the project		Priority of hiring to be given to qualified residents of the hosts and nearby barangays.
	Use of heavy equipment and vehicles during hauling and construction.	Possible incidences of respiratory illnesses.	Ensure protection of workers and residents from dusts coming from the operation of vehicles and equipment (e.g. use of personal protective equipment)	Number of local residents who contracted respiratory diseases		Implementation of health and safety standards: wearing of mask
	Earthworks and gravel road construction	Health and Safety impacts of workers	Adopt appropriate safety measures; provide first-aid services; and make workers aware of risks and how to avoid them.	Compliance to Construction, Safety and Health Program of the Contractor		Provision of first aid kits with first aid materials and equipment in the bunkhouse

Project Phase / Environmental Aspect	Source of Impact	Potential Impact	Prevention / Mitigation or Enhancement Measures	Parameters to be Monitored	Road Section	Recommendations
			Coordinate with nearest hospital and concerned government agency for emergency medical response and rescue operations	Compliance to Construction, Safety and Health Program of the Contractor		Proper orientation of workers on first aid
		Disruption of road traffic	Rerouting traffic and installation of road traffic signages	Compliance to Construction, Safety and Health Program of the Contractor	Entire road section	Installation of appropriate signages consistent with the safety standards
Abandonment/ Demobilization						
Land, Air, Water and People	General clean up of the work staging areas, freeing these from temporary structures, unserviceable equipment, formworks, used oils and lubricants, and sanitation facilities.	Failure to rehabilitate work-site, including borrow areas and work camps, causing erosion; increase in bacterial insect-borne disease from wastes etc.	Works Specification and Conditions of Contract. Ensure work camp is removed/rehabilitated in accordance with DPWH guidelines.	Compliance to Construction, Safety and Health Program of the Contractor	Bunkhouse	Implementation of proper solid and liquid waste management
	Continued monitoring, auditing and appropriate resourcing	Failure to continue with established practices, ongoing monitoring, auditing and appropriate resourcing. Decline in road quality and resultant impacts across the range of issues listed above.	Deemed to be manageable via DILG showing ongoing commitment to PRMF beyond the initial five year tenure. Budget set aside for monitoring and EMoP in place.	Compliance to Environmental Management System	Entire road section	Provision of budgetary allocation for institutionalizing EMoP including the community

Table 7: Social Development Plan

Proponent: Provincial Engineer's office

Note: List all the applicable social concerns during the community mapping. Responsible community / beneficiary will depend on the outcome of the consultation.

Concern	Responsible Community / Beneficiary	Government Agency / Non-government Agency and Services	Indicative Timeline
1. Employment: giving priority to the locals including women	Barangay Captain / Qualified Persons in the Barangay or Municipality	Provincial Government – Provincial Engineer's Office	Pre-construction; Construction and Abandonment phases
2. Health and Safety	Barangay Kagawad for Health / Affected residents	Municipal Health Office; Municipal Disaster Risk Reduction Management Council Provincial Engineer's Office/Health and Safety Officer; Contractor (for monitoring)	Construction; Post Construction
3. Peace and Order	Barangay Captains / Affected residents	Barangay Tanods; Philippine National Police; Philippine Army	Pre-construction; Construction
4. Gender	Provincial/Municipal/Barangay Governments; Barangay Kagawad for Women; NGO/CSO for women & residents	All agencies involved	Pre-construction; Construction and Post Construction
5. Affected Structures / agricultural Crops/trees	Affected residents/owners of rice fields and trees	Provincial Government:, Provincial Engineer's Office; Bohol Environment Management Office (BEMO); MLGU: Municipal Agricultural Officer, Municipal Assessor	Pre-Construction; Construction

Table 8: Information, Education and Communication Plan

Target Sector	Major Topics of Concern Related to the Project	IEC Scheme / Strategy	Information Medium	Indicative Timeline	Indicative Cost
1. Department of Interior and Local Government	Role of the agency in the implementation of the Environmental Management Plans	Meeting with DILG National; Regional and Provincial Offices	Report on the Environmental Management for Infrastructures and Roads (EMIR) Team accomplishments and activities/powerpoint presentation	Pre-construction	TBD
2. Provincial Local Government Unit	Formulation of Environmental Management Plan; Implementation of Environment Management System	Information dissemination during the PRMF Road Sector Meeting and during the Management Executive Board (MEB) Meeting	Report on the EMIR accomplishments and activities/powerpoint presentation	Pre-construction	TBD
3. Municipal Local Government Units (MLGUs)	Environmental Impacts of roads project Roles of the MLGUs in the implementation and monitoring of the EMP	Meeting with Municipal Mayors	Power point Presentation of the EMP	Pre-Construction, Construction	TBD
4. Affected residents of host Barangays	Mechanisms for resettlement; Environment Management System	Meeting at the Barangay	Discussion/Orientation on their roles in the monitoring of Environmental Management Plan implementation	Pre-construction / Construction	TBD