

Environmental Management Plan

July 2016

CAM: Rural Roads Improvement Project II

Contract Package CW 8: Improve 5 Mekong River Islands; Roads, 50 km; and 11 Jetties

Prepared by the Ministry of Rural Development, the Royal Government of Cambodia for the Asian Development Bank. This is an updated version of the environmental management plan included in the initial environmental examination originally posted on August 2014 available on <https://www.adb.org/sites/default/files/linked-documents/42334-014-ieeab.pdf>.

NOTE

In this report, "\$" refers to US dollars unless otherwise stated.

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**KINGDOM OF CAMBODIA
NATION RELIGION KING**



**MINISTRY OF RURAL DEVELOPMENT
PROJECT MANAGEMENT UNIT**

PROCUREMENT OF CIVIL WORKS

**PROJECT: RURAL ROADS IMPROVEMENT PROJECT II
ADB LOAN 3151-CAM/GRANT 0401-CAM/GRANT 0402-CAM**

**CONTRACT: PACKAGE CW 8 – IMPROVE 5 MEKONG RIVER ISLANDS,
ROADS 50 KM AND 11 JETTIES**

VOLUME I BIDDING DOCUMENT

- Without Prequalification-

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1. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

1.1 OVERVIEW

An Initial Environmental Examination (IEE) in compliance to the requirements of the Asian Development Bank – Safeguards Policy Statement, 2009 has been undertaken to assess the environmental impacts of the proposed Rural Roads Improvement Project -II (RRIP II) which concludes that the construction impacts will be manageable if the mitigation measures are implemented thoroughly. The EMP is based on the type, extent and duration of the identified environmental impacts. The EMP has been prepared by close reference to best practices and in line with ADB's Safeguard Policy Statement, 2009 and Environmental Assessment Guidelines. The effective implementation of the EMP, based on the implementation arrangements stipulated in the IEE for the Project, will be audited as part of the conditions of the Contract.

The findings and proposed mitigation measures have been compiled into a Matrix and is presented in Annex A. It summarizes all the anticipated environmental impacts and its applied mitigation measures during the construction and operation phase. Moreover, it makes reference to the approximate location, timeframe, mitigation costs, and the responsibility for its implementation and supervision. It should also be noted that many mitigation measures are assumed to be already part of standard design and construction methodology and practices.

1.2 PRE-CONSTRUCTION PHASE

Clearance of Unexploded Ordnance: Although the activities related to the project will only involve execution of works within the existing alignment and with no widening required, the risk of land mines or unexploded ordnance are always present including the provinces where the subject roads are to be upgraded. Considering the risks involved in the implementation of the works, the detailed design and implementation supervision consultant (DDIS) will engage a UXO specialist to determine the level of risk in each of all project roads and advise on the need for clearance. Any clearance that is required will be undertaken through the civil works contracts, by the engagement of qualified local UXO clearance firms. The Environmental Specialist (ES) of the Project Management Unit-Social and Environmental Office (PMU-SEO) with the assistance of the International Specialist (IES) and National Environmental Specialist (NES) of the Detailed Design and Implementation Supervision Consultants (DDIS) will provide the requisite recommendation to the Engineer for the areas where the Contractor can commence works on the basis of the recommendation of the UXO Clearance Company. The Contractor will only be allowed to commence works on the site(s) after the appropriate certification by the qualified UXO Clearance Company are provided.

Contractor prepares CEMP: Following the award of the contract and before commencing work the Contractor will be required to prepare a Contractor's Environmental Management Plan (CEMP) that addresses all the conditions of the construction EMP that has been attached to the Bid and Contract Documents. The CEMP will amplify how the Contractor will address the activities in the construction section of the EMP. The Contractor will submit the CEMP to the Engineer within a month after the contract is awarded and the IES and NES of the DDIS will review and evaluate the CEMP and make the necessary recommendation to the PMU-SEO through the Engineer for the ultimate approval of the CEMP by the PMU and the ADB before commencement of any civil works. During construction, the Contractor will work according to the requirements of the CEMP as was prepared by him. Supervision and monitoring of the CEMP activities will be undertaken as follows:

- The Contractor has the initial responsibility for supervising and monitoring of the CEMP as provided for in the supervision of the works contract.
- The ES of the PMU-SEO with the assistance of the IES and the NES of the DDIS will direct the Contractor with regard to compliance with the CEMP.

- The PMU-SEO will carry out independent monitoring of the work and can issue Defect Notices to the Engineer who will transmit these to the Contractor for the appropriate corrective action(s).
- The Contractor will have his own representative on site for the duration of the contract the designated Environmental Officer (EO) who will be responsible for implementing the CEMP and complying with the environmental laws and regulations of the Kingdom of Cambodia and the Safeguards requirements of the Asian Development Bank (ADB) as stipulated in the Safeguards Policy Statement, SPS 2009.

Induction of Contractor to Site: Following the selection of the Contractor and the approval of the CEMP, the Contractor together with his EO will meet the ES of the PMU-SEO, the IES and NES of the DDIS on-site where the CEMP conditions will be confirmed with the Contractor. When the ES of the PMU-SEO, the IES and NES of the DDIS are confident that the Contractor understands and can comply with the CEMP, they will advise the Engineer and the PMU that the Contractor can commence work.

Establishment of the Grievance Redress Mechanism: During the course of the project it is possible that people will have, concerns with the project's environmental performance including the implementation of the EMP. Issues may occur during construction and again during operation. Any concerns will need to be addressed quickly and transparently, and without retribution to the AP. A grievance redress mechanism (GRM) will be established by the Contractor to address this based on existing frameworks of the Asian Development Bank as stipulated in the Safeguards Policy Statement (SPS) of June 2009 and the appropriate environmental and cultural laws and guidelines of the Kingdom of Cambodia as being enforced by the Ministry of Environment (MOE). To ensure that there will be a mechanism to resolve such complaints, Contractor together with the MRD, (through the PMU-SEO with the assistance of the IES and NES of the DDIS) will undertake the following prior to commencement of site works:

- Establish a grievance redress mechanism (GRM)
- Make public the existence of the GRM through public awareness campaigns
- Ensure that names and contact numbers of representatives of MRD and contractors are placed on the notice boards outside any construction sites and at local government offices (e.g., provincial and commune levels)

Through a Grievance Redress Committee (GRC), the Contractor and the MRD shall promptly address affected people's concerns, complaints, and grievances about the Project's environmental performance at no cost to the complainant and without retribution. The GRC, which will be established before commencement of site works, will be chaired by PMU-SEO to be assisted by the Contractor and the IES and NES of the DDIS. The GRC shall have members from the PDRD, commune councils, local NGO, and women's organization.

Grievances can be filed in writing or verbally with any member of the GRC. The committee will have 15 days to respond with a resolution. If unsatisfied with the decision, the existence of the GRC shall not impede the complainant's access to the Government's judicial or administrative remedies.

The Contractor, together with the PMU-SEO, through the PDRDs, will make public the existence of this grievance redress mechanism through public awareness campaigns. The Contractor, together with the PMU-SEO will establish a hotline for complaints and the hotline will be publicized through the media and numbers placed on the notice boards outside the construction sites and at local government offices (e.g., provincial, district, commune levels). Affected Persons (APs) will still be able to express grievances through the commune councils and these would be referred to the GRC through the usual channels in those committees.

The GRC, through the Contractor/PMU-SEO, will receive, follow-up and prepare monthly reports regarding all complaints, disputes or questions received about the Output and corresponding actions taken to resolve the issues and concerns. The Contractor/PMU-SEO will develop and maintain a database of complaints received related to this. The GRC will also use the punitive clauses of the 1996 Law on Environmental Protection and Natural Resources Management in conjunction with MoE to prosecute any offending parties.

1.3 CONSTRUCTION PHASE

Preparation of Site and Establishment of Contractor's Facilities: This applies to all of the Contractor's facilities, storage areas, workshops, concrete batching areas, fabrication areas etc. As it is intended that local labor will be hired for the works, no worker's camps are required for the execution of the Contract. The location and development of Contractor's facilities are to be approved by the Engineer and the ES of the PMU-SEO, with the assistance of the IES and NES of the DDIS will be responsible for the supervision and monitoring of the Contractor. The sites are to be selected so that:

- Size of Contractor's facilities are limited to reduce unnecessary clearing of vegetation or encroaching community's land.
- Sanitary waste and grey water is not to be released untreated into surface water systems or to watercourses/bodies in contravention of the Sub-Decree on Water Quality.
- Drainage will be provided to facilitate the rapid removal of surface water from all areas and prevent flooding and accumulation of stagnant water.
- Fuel storage areas are not to be located within 500m of a water course/body.
- The Contractor's facilities are to be contained within an adequate security fence.
- Wastewater effluents from Contractors' workshops and equipment washing-yards, fabrication areas will be passed through gravel/sand beds and all oil/grease contaminants will be removed before wastewater is discharged. Oil and grease residues will be stored in tightly covered drums. Such wastes will be disposed consistent with national and local regulations, specifically MoE Praka No. 992 Regulation on Industrial Solid and Liquid Waste Management (1994).

Clearing of Sites and Removal and Disposal of Vegetation: This applies to the work areas (roads and jetties) and the Contractor's site facilities. The Contractor will establish the listed below measures to address the projected impacts of the activity. The ES of the PMU-SEO with the assistance of the IES and NES of the DDIS will be responsible for the supervision and monitoring of the Contractor.

- Wherever possible, limit area to be cleared and avoid excessive machine disturbance of the topsoil. The area to be cleared should clearly defined by a by an established boundary.
- 50m wide buffer zones are to be established at places abutted with watercourses/bodies.
- Cleared material is to be pushed into manageable sized heaps according to disposal or re-use requirements.
- Spoils and all types of wastes will not be dumped into forested areas, agricultural land, densely vegetated areas, and water courses.
- Workers will be prohibited from collecting firewood and construction materials from surrounding forests, and from hunting wild animals.

- Construction vehicles will operate within the corridor of impact, i.e., approximately within ROW, to avoid damaging soil and vegetation. It will be most important to avoid soil compaction around trees. Generally the rule will be to avoid driving heavy equipment or trucks anywhere into the 'drip-line' of a tree (defined as imaginary line around a tree where rainwater falls freely to ground unimpeded by the tree's foliage).
- The Contractor will not use or permit the use of wood as a fuel for the execution of any part of the Works, including but not limited to the heating of bitumen and bitumen mixtures.
- Asphalt mixing plants, material storage sites and other project facilities will not be located in the forest areas and other densely vegetated sites.
- Contractor will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractor will immediately suppress the fire, if it occurs, and will undertake replanting to replace damaged vegetation.

Encroachment/Damage to Culturally Significant Areas: The Project will involve improvements to existing roads by paving with DBST without widening or realignment and reconstruction/rehabilitation of existing jetties. In the event of any construction work uncovering or revealing archaeological relics these will be deemed a "chance find" and reported as such to the Ministry of Culture and Fine Arts. All work on the site must stop until MoCFA issue a statement that work may be resumed. To ensure that site works and other project-related activities will not adversely affect culturally significant sites, the Contractor will establish the below listed measures and the ES of the PMU-SEO with the assistance of the IES and NES of the DDIS will be responsible for the supervision and monitoring of the Contractor.

- All project-related activities will be implemented consistent with the policies, rules and regulations as mandated by the MoCFA.
- The contractor will ensure that project activities will not cause damage to any archaeological relics.
- If during the execution of works, relics or archeologically important artefacts are discovered, this will be immediately reported to the Engineer and the MoCFA or other concerned government agency under the Law on Cultural Heritage of 1996. All works will be stopped until the proper authorities provide the requisite clearance to proceed.

Prevention of Soil Erosion and Sedimentation of water channels: The contractor will be responsible for ensuring that the erosion is contained by appropriate soil conservation protection methods. The ES of the PMU-SEO with the assistance of the IES and NES of the DDIS will be responsible for the supervision and monitoring of the Contractor. The following are recommended to be undertaken to mitigate potential soil erosion in the work sites:

- Limit the extent of excavation to reduce soil erosion potential.
- Install control structures or apply soil conservation protection methodology to susceptible areas to avoid storm water runoff carrying eroded materials either, off-site to susceptible areas, or onto already finished work areas.
- Schedule construction so that large areas of soil are not laid bare during wet season and avoid excavating areas and operating machinery in wet ground conditions.
- When needed (particularly work area abutted with watercourses/bodies), contain construction areas using a bund or trench, or isolate them from other surface run-off, and clean and rehabilitate them when construction is complete.
- Avoid discharging water to watercourses/bodies.

- Road embankments and slopes will be monitored during construction for signs of erosion, vegetative cover will be provided on slopes by planting native grass and creepers on erosion prone sections.
- Long-term material stockpiles will be covered with native species of grass or other suitable materials to prevent wind erosion.
- Upon completion of works, the Contractor will ensure that all excavated areas are properly stabilized. This includes the rehabilitation of all disturbed areas by the most appropriate and effective method.

Water Quality Drainage and Jetty Works: Jetty and drainage works, stockpiling of construction materials and spoils, use of hazardous materials and earthworks if not properly managed are likely to cause deterioration of surface water quality, flooding and flow obstruction of watercourses. These impacts will be minimized through implementation by the Contractor of the following measures and the ES of the PMU-SEO with the assistance of the IES and NES of the DDIS will be responsible for the supervision and monitoring of the Contractor:

- Firmly consolidate channel banks using stones, concrete and other suitable retaining measures at each jetty/drainage construction site and ensure that water courses (rivers, canals, etc.) will be kept free of excavation spoil and construction debris, floating and submerged.
- Spoils, construction wastes and construction materials stockpile area will be located away from water bodies and under no circumstances will these materials be dumped into watercourses.
- Do not fill up canals and creeks at the construction site. In case filling of local drainage system is necessary, consultation with local authorities will be undertaken and their permission obtained beforehand. An alternative drainage will be established before the existing canal is filled-up.
- Prohibit placement of construction materials, waste storage areas or equipment in or near drainage channels and water courses.
- Discharge of oily wastewater, fuel, hazardous substances and wastes, and untreated sewage to watercourses/canals and on the ground/soil will be prohibited to comply with the MoE Praka No. 992 Regulation on Industrial Solid and Liquid Waste Management (1994).
- Provide adequate drainage at the construction sites and other project areas to avoid flooding of surrounding areas and minimize flow obstruction of existing watercourses.
- Regularly inspect and maintain all drainage channels to keep these free of obstructions.
- Slope stabilization measures (e.g., planting of fast growing native species of grass and shrubs, etc.) will be implemented on exposed surfaces along river embankments to reduce material wash-away.
- Construct retaining structures such as gabion baskets, rip-rap, etc. for river bank protection.

Storage and Handling of other Construction Materials, Fuel and Lubricants: Other construction materials will include sand, gravel and cement for concrete manufacture, reinforcing rods and steel mesh, wood and other construction materials, fuel and lubricants. The PMU-SEO will be responsible for the supervision and monitoring of the Contractor with the assistance of the IES and NES of the DDIS. The following measures will be established by the Contractor to mitigate projected adverse impacts:

- Areas will need to be prepared for storing these materials. Fuel and oil will need to be stored in dedicated areas at least 50m away from the water courses/bodies. Where >5000 liters of fuel is stored on site, the fuel must be stored in sealed tanks that are provided with a concrete base that is bunded to hold 110% of the tank capacity.
- All workshops with significant activities will be provided with oil and water separators.
- Vehicles and machinery are not to be refuelled within 500m of the nearest water course/body.
- The Contractor will have trained personnel who are competent in fuel handling procedures and for cleaning up accidental spills.
- Any major spill in the vicinity will immediately be reported by the Contractor to the Engineer and PMU-SEO.
- All waste oil, oil and fuel filters will be collected and disposed of in safe and secure disposal facilities.
- At the closure of the site all contaminated soil will be excavated, removed and replaced with fresh topsoil.

Noise Control and Vibration: This applies to all machinery, vehicles and construction sites where noise and vibration may affect susceptible receptors. The Contractor will be responsible for ensuring that noise and vibration does not affect the surrounding communities. The Contractor must be prepared to curtail work to daylight hours (0700hrs - 1700hrs) should the community find that any night time operations becomes a nuisance. Further, the Contractor will undertake regular measurements of ambient noise levels in selected sampling stations as identified and stipulated in the Environmental Monitoring Plan. The PMU-SEO will be responsible for the supervision and monitoring of the Contractor with the assistance of the IES and NES of the DDIS. Suggested measures to achieve this objective will also include:

- No noisy construction-related activities (e.g., transport of materials along residential areas and other sensitive receptors, piling, use of jackhammer, etc.) will be carried out from (2100 hrs to 0600 hrs) along residential areas, hospitals and other sensitive receptors.
- Noisy construction activities will be avoided during religious or cultural events in close proximity to the roadside such as Friday prayers attended by Muslim Cham, when ethnic Khmer are attending temple festivals or holding weddings, etc.
- All construction equipment and vehicles will be well maintained, regularly inspected, and will be fitted with effective muffler and other appropriate noise suppression equipment consistent with applicable national and local regulations.
- Use only vehicles and equipment that are registered and have necessary permits.
- Truck drivers and equipment operators will avoid, as much as possible, the use of horns in densely populated areas and where other sensitive receptors such as schools, temples, hospital, etc. are located.
- Impose speed limits on construction vehicles to minimize noise emission along areas where sensitive receptors are located (houses, schools, temples, hospitals, etc.).
- Provide temporary noise barriers (3-5 meter high barrier can reduce 5-10 dB(A)), as necessary, if site works will generate high noise levels that could disturb nearby households, hospital, school and other sensitive receptors.
- Avoid noisy construction activities in vicinity of sensitive receivers during night time or other sensitive periods (e.g. during school hours in vicinity of schools).

Worker Safety, Health, and Hazard: Before commencing work, the Contractor will be required to identify hazards and prepare an emergency response plan to address serious accidents and nominate a person who is to be immediately contacted should an accident occur. The emergency response plan is to be submitted to the Engineer for approval one week prior to commencement of works. The PMU-SEO will be responsible for the supervision and monitoring of the Contractor with the assistance of the IES and NES of the DDIS.

- The Contractor will undertake pre-employment health screening to ensure that workers that will be hired are healthy and are not carriers of contagious/communicable diseases.
- The Contractor will be required to keep the site free of drugs and alcohol.
- The Contractor is also to provide first aid facilities on-site and employ a competent person trained in first aid.
- Conduct orientation for construction workers regarding emergency response procedures and equipment in case of accidents (e.g., head injury from falling, burns from hot bitumen, spills of hazardous substances, etc.), fire, etc.; health and safety measures, such as on the use of hot bitumen products for paving of project roads, etc.; prevention of HIV/AIDS, malaria, diarrhea, and other related diseases. A copy of the emergency response plan should be submitted to Engineer and displayed in easily accessible place.
- The Contractor will undertake an introduction to health and safety issues in construction sites including main areas of risk to workers and others, education on basic hygiene practices to minimize spread of typical tropical diseases and HIV/AIDS and STD awareness, including information on methods of transmission and protection measures to all workers and staff.
- Ensure all occupational health and safety requirements are in place on construction sites and provide workers with appropriate safety equipment/devices (such as dust mask, safety helmets, safety shoes or boots, goggles, ear plugs, etc.) and strictly require them to use these as necessary.
- Provide fire extinguish equipment and appropriate emergency response equipment (based on on-going construction activities) at the work areas and at construction camps.
- Install sign boards, lighting system at the construction sites, borrow pits, or places which may cause accidents for vehicle, people and workers
- Strictly impose speed limits on construction vehicles along residential areas and where other sensitive receptors such as schools, pagodas, hospitals, and other populated areas are located.
- Educate drivers on safe driving practices to minimize accidents and to prevent spill of hazardous substances and other construction materials by providing covers over transporting dump trucks.
- Barriers (e.g., temporary fence) will be installed at construction areas to deter pedestrian access to these areas except at designated crossing points.
- The general public/local residents will not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation.
- Measures to prevent malaria will be implemented (e.g., spraying of insecticides, installation of proper drainage to avoid formation of stagnant water, etc.).

Air Quality and Dust Control: This applies to all of the construction sites and haul roads. Work that is carried out during the drier time of the year and especially when wind speeds increase may create

localized dusty conditions. The Contractor will establish the measures listed below to mitigate the projected adverse impacts as a result of the execution of works and the PMU-SEO will be responsible for the supervision and monitoring of the Contractor with the assistance of the IES and NES of the DDIS.

- During construction when dust may be generated, the Contractor is to monitor the worksite conditions and apply dust control measures which includes reducing traffic movements and spraying water on exposed areas.
- The Contractor will ensure community safety from increased vehicle movements: this applies to all vehicles and in particular haul trucks that have to pass through villages.
- The Contractor will ensure that all vehicles that may be required to pass through villages and transport equipment and materials are operated safely without endangering these communities.
- The Contractor will ensure that heavy equipment, haul trucks and other vehicles are maintained in a safe operating condition, that all drivers and machinery operators act responsibly, that all loads are to be secured and all loads with fugitive materials (e.g., excavated soil and sand) are to be covered with tarpaulins, immediate repairs of any malfunctioning construction vehicles and equipment will be undertaken and that any drivers that ignore any of the community safety requirements will be removed.
- The Contractor will undertake regular measurements of ambient air quality (Total Suspended Particulates, SO_x and NO_x) in selected sampling stations as identified and stipulated in the IEE and EMP.
- Equipment and vehicles not in use will be switched off.
- Machinery and vehicles causing excessive pollution (e.g., visible smoke) will be banned from construction sites.
- All construction equipment and vehicles will have valid certifications indicating compliance to vehicle emission standards.
- Siting of bitumen plants, concrete mixing plants, crushing plants and other facilities that cause high dust and/or gaseous emissions should be at least 500m from settlements and other sensitive receptors (schools, hospitals, etc.)
- Necessary environmental clearance/approval from the MOE and its instrumentalities will be obtained prior to establishment and operation of asphalt mixing plants, crushing plants and other facilities.
- On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials stockpile, construction sites, access roads, quarry areas, borrow sites and other project areas where residential sites and other sensitive receptors are located nearby.
- Impose speed limits on construction vehicles to minimize dust emission along areas where sensitive receptors are located (houses, schools, hospitals, temples, etc.).
- Position any stationary emission sources (e.g., portable diesel generators, compressors, etc.) as far as is practicable from sensitive receptors;
- Burning of wastes generated at the construction sites and other project related activities will be strictly prohibited.
- Provide temporary covers (e.g., tarpaulins, grass, etc.) on long term materials and spoils stockpiles.
- Clean road surfaces of debris/spills from construction equipment and vehicles.

- Install temporary fencing or barriers around particularly dusty activities in vicinity of sensitive receivers.
- Locations for stockpiling spoils, fill and other materials with high dust content will be at least 500 m from the nearest residential areas and other sensitive receivers.

Quarry and Borrow Pits: Material sources will need to be established by the Contractor for the requisite aggregates necessary for the execution of works. The Contractor will establish the measures listed below at quarry and borrow sites to minimize impacts on water quality, reduce dust emission during transport, minimize erosion and siltation of nearby water courses and avoid damage to productive land and ecologically sensitive areas. The PMU-SEO will be responsible for the supervision and monitoring of the Contractor with the assistance of the IES and NES of the DDIS.

- Sourcing of quarry and borrow materials from existing sites will be preferred over establishment of new sites, as much as possible. In case the Project will involve new quarry/borrow sites, necessary approvals from environmental authorities will be obtained prior to operation of such sites. Such sites will be located over 500m away from residential, school, hospital and other sensitive receptors.
- Quarries and borrow pits will not be established in national, provincial, district and village conservation forests and other ecologically sensitive and protected areas. Borrow/quarry sites will not be located in productive land.
- Quarry and borrow sites must be selected amongst those offering the highest ratio between extractive capacity (both in terms of quality) and loss of natural state. Quarry and borrow sites lying close to the alignment, with a high level of accessibility and with a low hill gradient, are preferred.
- Prior to extraction, topsoil (about 15 cm) will be stockpiled, preserved and then refilled after completion of quarry/borrow pit operation for rehabilitation purposes after excavation is over.
- During quarry and borrow site operation, adequate drainage will be provided to avoid accumulation of stagnant water. Dust control during excavation and transport (e.g., water spraying on access roads and provision of truck cover) will be undertaken in areas where there are sensitive receptors such as residential areas, school, hospital, etc. Long-term material stockpiles will be covered to prevent wind erosion.
- The use of river bed sources will be avoided, as much as possible, however if this is unavoidable the Contractor will minimize use of river bed for construction materials and sources of fill and quarry materials lying on small rivers and streams. Alluvial terraces or alluvial deposits which lie on the river beds but not covered by water in normal hydrological conditions will be preferred. Protect and reinstate river banks if unexpected erosion occurs and confine winning river bed materials to less than 20% of river width in any location and keep away from river banks.
- Upon completion of extraction activities, borrow pits will be dewatered and fences will be installed, as appropriate, to minimize health and safety risks. The Contractor will also re-contour borrow/quarry pit wall or fill-up when there are available and suitable materials such as excavation spoils, replace topsoil, and re-vegetate with native species such as grasses and fast-growing shrubs and trees.
- Borrow pits will be left in a tidy state with stable side slopes and proper drainage in order to minimize soil erosion, siltation of nearby bodies of water and to avoid creation of water bodies favorable for mosquito breeding.
- Villagers may request borrow pits to be left excavated so that they may be used as water reservoirs or fishponds. If this were to be agreed between the contractors and the villagers, all the full safety measures detailed above must be observed. Such

agreements would be formalized in writing between the contractors and the villagers after full discussion with all concerned parties.

Prohibited Activities: The Contractor will be aware of the activities shown in Appendix 5 of the Safeguard Policy Statement of the ADB (SPS June 2009), Prohibited Investment Activities List. Any listed Appendix 5 activities are prohibited. The PMU-SEO with the assistance of the IES and NES of the DDIS need to verify that the Contractor is aware of the Appendix 5 requirements and that none of these activities will be sanctioned during construction. The PMU-SEO will be responsible for the supervision and monitoring of the Contractor with the assistance of the IES and NES of the DDIS. The following do not qualify for Asian Development Bank financing as per the ADB Prohibited Investment Activities List:

- Production or activities involving harmful or exploitative forms of forced labor¹ or child labor².
- Production of or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements or subject to international phase outs or bans, such as (a) pharmaceuticals³, pesticides, and herbicides⁴, (b) ozone-depleting substances⁵, (c) polychlorinated biphenyls⁶ and other hazardous chemicals⁷, (d) wildlife or wildlife products regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora⁸, and (e) trans-boundary trade in waste or waste products⁹.
- Production of or trade in weapons and munitions, including paramilitary materials.
- Production of or trade in alcoholic beverages, excluding beer and wine¹⁰.
- Production of or trade in tobacco¹¹.
- Gambling, casinos, and equivalent enterprises¹².
- Production of or trade in radioactive materials¹³, including nuclear reactors and components thereof.
- Production of, trade in, or use of un-bonded asbestos fibers¹⁴.
- Commercial logging operations or the purchase of logging equipment for use in primary tropical moist forests or old-growth forests.
- Marine and coastal fishing practices, such as large-scale pelagic drift net fishing and fine mesh net fishing, harmful to vulnerable and protected species in large numbers and damaging to marine biodiversity and habitats.

¹ Forced labor means all work or services not voluntarily performed, that is, extracted from individuals under threat of force or penalty.

² Child labor means the employment of children whose age is below the host country's statutory minimum age of employment or employment of children in contravention of International Labor Organization Convention No. 138 "Minimum Age Convention" (www.ilo.org).

³ A list of pharmaceutical products subject to phase outs or bans is available at <http://www.who.int>.

⁴ A list of pesticides and herbicides subject to phase-outs or bans is available at <http://www.pic.int>.

⁵ A list of the chemical compounds that react with and deplete stratospheric ozone resulting in the widely publicized ozone holes is listed in the Montreal Protocol, together with target reduction and phase-out dates. Information is available at <http://www.unep.org/ozone/montreal.shtml>.

⁶ A group of highly toxic chemicals, polychlorinated biphenyls are likely to be found in oil-filled electrical transformers, capacitors, and switchgear dating from 1950 to 1985.

⁷ A list of hazardous chemicals is available at <http://www.pic.int>.

⁸ A list is available at <http://www.cites.org>.

⁹ As defined by the Basel Convention; see <http://www.basel.int>.

¹⁰ This does not apply to project sponsors who are not substantially involved in these activities. Not substantially involved means that the activity concerned is ancillary to a project sponsor's primary operations.

¹¹ This does not apply to project sponsors who are not substantially involved in these activities. Not substantially involved means that the activity concerned is ancillary to a project sponsor's primary operations.

¹² This does not apply to project sponsors who are not substantially involved in these activities. Not substantially involved means that the activity concerned is ancillary to a project sponsor's primary operations.

¹³ This does not apply to the purchase of medical equipment, quality control (measurement) equipment, and any equipment for which ADB considers the radioactive source to be trivial and adequately shielded.

¹⁴ This does not apply to the purchase and use of bonded asbestos cement sheeting where the asbestos content is less than 20%.

Disposal of Waste Materials: The execution of works and the establishment and operation of the ancillary facilities necessary for the implementation of the civil works will result in the generation of solid waste. Improper waste management could result to odor and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the receiving environment. The Contractor will submit a Solid Waste Management Plan (SWMP) to address this concern one (1) month upon his arrival on site. This will be submitted to the Engineer for approval. The ES of the PMU-SEO with the assistance of the IES and NES of the DDIS will review and evaluate the SWMP for appropriate recommendation for approval by the Engineer. The PMU-SEO will be responsible for the supervision and monitoring of the Contractor with the assistance of the IES and NES of the DDIS. Further, the Contractor will establish the following measures:

- All construction waste materials including debris from the demolition of jetty(ies), drums, timber off-cuts, sand and gravel, cement bags, etc., are to be suitably disposed of. If these cannot be recovered for scrap value these materials will be taken to approved landfill sites and properly disposed.
- The Contractor will contain all waste within construction sites; properly dispose all used fuel and lubricant oils in environmentally sound manner, either recycle or for other use.
- Prohibit disposal of solid wastes into canals, rivers and other watercourses, agricultural fields and public areas.
- There will be no site-specific landfills established by the Contractors. All solid waste will be regularly collected and removed from the work camps and disposed to areas approved by local authorities.
- Burning of construction and domestic wastes are strictly prohibited.
- Recyclables will be recovered and sold to recyclers.
- Residual and hazardous wastes will be disposed of in disposal sites approved by local authorities.
- Ensure that wastes are not haphazardly dumped within the project site and adjacent areas.

Damage to Community Facilities: Transport of materials and spoils, operation of construction equipment and various construction activities may damage community utilities. The Contractor will implement the following measures to address this impact and the ES of the PMU-SEO will be responsible for the supervision and monitoring of the Contractor with the assistance of the IES and NES of the DDIS.

- The Contractor will immediately repair any damage caused by the Project to community facilities such as water supply, power supply, irrigation canals, drainage and the like. Adequate and just compensation will be paid to affected parties, as necessary.
- The Contractor will not allow overloading of trucks used for all project-related activities and in case access roads are damaged during transport of construction materials and other project related activities, these will be reinstated upon completion of construction works.

Traffic Disruption and Access Obstruction: Road and Jetty construction works are expected to cause traffic disruption and congestion and obstruction of access to properties and establishments. Lack of proper traffic warning signs and other safety measures (e.g., sufficient lighting at night at construction sites, etc.) could cause accidents. The following measures will be implemented by the Contractor to minimize such impacts with the ES of the PMU-SEO responsible for the supervision and monitoring of the Contractor with the assistance of the IES and NES of the DDIS.

- In cooperation with the local traffic authorities, properly organize transport of materials for the project to avoid congestion.
- Set up clear traffic signal boards and traffic advisory signs at the roads and going in and out the road and jetty construction sites to minimize traffic build-up.
- Regularly monitor traffic conditions along access and Project roads to ensure that project vehicles are not causing congestion.
- Provide sufficient lighting at night within and in the vicinity of construction sites.
- Implement suitable safety measures to minimize risk of adverse interactions between construction works and traffic flows through provision of temporary signals or flag controls, adequate lighting, fencing, signage and road diversions.
- Provide temporary accesses to properties and establishments affected by disruption to their permanent accesses.
- Reinstate good quality permanent accesses following completion of construction.
- Provide safe vehicle and pedestrian access around construction areas and adequate signage, barriers and flag persons for traffic control.
- If necessary, traffic will be diverted for safe and smooth movement of vehicles to ensure smooth traffic flow and minimize accidents, traffic hold ups and congestion.
- The diversion signs would be bold and clearly visible particularly at night.
- Temporary bypasses will be constructed and maintained (including dust control) during the construction period particularly at bridge crossings. Location of temporary bypasses will be agreed with local authorities and such sites will be reinstated upon completion of works.

Social Conflicts: The presence of workers could cause conflicts with local communities. These will be avoided by implementing the following measures:

- Regularly inform in advance the local officials and local residents on the location and schedule of construction activities which may cause impacts on the environment and life of people (e.g., road sections to be constructed; roads used for transport, locations of worker camps etc.)
- Locate Contractor's facilities away from communities (at least 500 m away) in order to avoid social conflict in using resources and basic amenities such as water supply.
- Maximize number of local people employed in construction works and Maximize goods and services sourced from local commercial enterprises.

Site De-commissioning – Clearance and Rehabilitation of Construction Sites and Removal of Contractor's Facilities: It is the responsibility of the Contractor to address site clean up. This includes the removal all waste materials, machinery and any contaminated soil. The Contractor will establish the listed measures. The PMU-SEO will be responsible for the supervision/monitoring of the Contractor with assistance from the IES and NES of the DDIS.

- All construction sites and work areas will be rehabilitated so that these can be returned as close as possible to their previous use. This includes the stabilization and landscaping of all of the construction sites.
- No waste will remain behind after work is completed that will not naturally and safely decompose. Should wastes not be removed, the Owner is entitled to withhold payment and arrange the clean up and deduct the cost of the clean-up from the final payment amount less an additional 10% for arranging the task.

2. ENVIRONMENTAL MONITORING PLAN

A general Environmental Monitoring Plan to cover the program is presented in Annex B. The Monitoring Plan focuses only on impacts of the project that are likely to need attention. A baseline survey will be conducted prior to commencement of works to establish the benchmark levels of the environmental parameters. The main components of the monitoring plan include for each project stage the:

- Environmental issue to be monitored and ways for verification.
- Specific areas and locations to be monitored; parameter to be monitored;
- Applicable standards and criteria.
- Duration and frequency and estimated monitoring costs.
- Institutional responsibilities for monitoring and supervision.

Furthermore, the Contractor is mandated to establish a Complaints database, which would contain all the information on complaints received by the communities or other stakeholders. This would preferably include: the type of complaint, location, time, actions to address these complaints, and final outcome.

ANNEXES

**ANNEX A :
MATRIX OF THE ENVIRONMENTAL MANAGEMENT PLAN**

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL IMPACTS/CONCERN	PROPOSED MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
IMPACTS AND MITIGATING MEASURE DUE TO LOCATION				
ROAD ALIGNMENT	Incurion into agricultural lands	<ul style="list-style-type: none"> ▪ Maintain existing alignment 	Contractor	PMU-SEO/DDIS
RAISING ROAD AFFECTING HYDROLOGY OR DRAINAGE	Possible road failure due to impoundment of flood waters	<ul style="list-style-type: none"> ▪ Extra cross drainage to be provided. Included in detailed design. 	Contractor	PMU-SEO/DDIS
ROAD WIDENING	Loss of infrastructure	<ul style="list-style-type: none"> ▪ Minimal Impacts, road width to be maintained. 	Contractor	PMU-SEO/DDIS
NEED FOR FILL MATERIAL	Loss of Agricultural Land for Borrow Pits	<ul style="list-style-type: none"> ▪ Develop alternative uses for borrow pit areas with agreement of farmers and villagers. Some villagers request borrow pits to be left as water ponds for use by village. ▪ Do not use Mekong River sand 	Contractor	PMU-SEO/DDIS
CUTTING OF ROADSIDE TREES	Loss of roadside trees, loss of shade and utility	<ul style="list-style-type: none"> ▪ Compensation to be paid or trees replaced. 	Contractor	PMU-SEO/DDIS
CUT FACES AND SLOPES NEAR JETTIES	Erosion and instability of cut	<ul style="list-style-type: none"> ▪ Design cut slope to minimize instability. ▪ Use stabilization measures such as vegetation retaining walls and gabions, if necessary. ▪ Vegetate slopes 	Contractor	PMU-SEO/DDIS
MORE DRAINAGE STRUCTURES	Localised flooding	<ul style="list-style-type: none"> ▪ Position drainage structures to ensure that runoff is conveyed into natural drainage lines at controlled velocities. ▪ If more concrete surface roads are provided include in Detailed Design more drainage 	Contractor	PMU-SEO/DDIS
IMPACTS AND MITIGATING MEASURES DUE TO CONSTRUCTION ACTIVITIES				
MOBILIZATION OF EQUIPMENT AND WORKFORCE	Accident risk from mobilizing construction equipment	<ul style="list-style-type: none"> ▪ Minimize the mobilization of heavy equipment during night time ▪ Control movement of heavy equipment on ferries 	Contractor/Local Police	PMU-SEO/DDIS
MOBILIZING WORKFORCE	The introduction of an outside workforce can have a negative impact on the health and social well-being of local people	<ul style="list-style-type: none"> ▪ Conduct special briefing or on-site training on environmental requirement of the project to workers. ▪ Strictly supervise workers not to interfere in local affairs or quarrel with local people. ▪ In case of complaints from local people on the issues caused by workers, the complaints should be addressed and resolved as soon as possible, by collaboration of contractor and village representatives 	Contractor	PMU-SEO/DDIS
BEHAVIOUR OF WORKERS	Impacts on local wildlife by Workforce in contravention of Joint Prakas of the Ministry of Environment and the Ministry of Agriculture on Prohibition of Hunting and Catching of Wildlife Animals (1996)	<ul style="list-style-type: none"> ▪ Carry out awareness-raising campaigns on wildlife value for workers ▪ Any worker conduct hunting, or buying wildlife from local people, will be dismissed from job ▪ Supply workers with sufficient food from outside the project 	Contractor	PMU-SEO/DDIS/MoE/MAFF
PROTECTING WORKERS SAFETY	Accident risk from mobilizing	<p>The following safety precautions should be provided to workers:</p> <ul style="list-style-type: none"> ▪ Warning and/or Precaution Signs on safety ▪ Provide full PPE; Helmets, boots, warning jackets etc. ▪ Instruction on health and safety ▪ Establishment of all relevant safety measures required by law and good engineering practices ▪ Explain use of life jackets if travelling on ferry 	Contractor	PMU-SEO/DDIS
HEALTH ASPECTS	Outbreak of disease	<ul style="list-style-type: none"> ▪ The contractor shall have all his workers undergo a medical screening prior to their arrival on site, to check for HIV/AIDS, sexually transmitted diseases, and to provide an 	Contractor	PMU-SEO/DDIS/MoH

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL IMPACTS/CONCERN	PROPOSED MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
		awareness program. Any workers screening positive for such diseases shall not be allow on the site <ul style="list-style-type: none"> ▪ Site construction camps far away from local communities ▪ Keep camps from becoming blight on the local environment ▪ Provide enough water supplies for workers, and ensure sufficient sanitation for the camp: the proper location for solid waste disposal ▪ Make medical treatment available for workers. ▪ Provide workers mosquito nets and malaria prevention medication, if needed, spray around camp area with chemicals against mosquitoes 		
PROVIDING FUEL FOR WORKERS	Depletion of natural resources through demand for building materials, fuel and food for workers	<ul style="list-style-type: none"> ▪ Do not harvest wood resources within forests ▪ Where local materials must be used, make agreements with local communities about the areas or the volume that can be harvested without significant impact ▪ Support community development by paying an adequate price for any local resources used ▪ All supplies for building camps should be brought from outside area 	Contractor	PMU-SEO/DDIS
IMPACTS AND MITIGATING MEASURES DUE TO ESTABLISHMENT OF CONTRACTORS FACILITIES				
CONSTRUCTION WORK AREAS	Loss of water quality in contravention of Sub-Decree on Water Quality	<ul style="list-style-type: none"> ▪ Re-vegetation of construction area. This relates to grass seeding of slopes of new embankments for soil stabilisation and control of sediment run off 	Contractor	PMU-SEO/DDIS
WORK IN STREAM CHANNELS	Loss of water quality in contravention of Sub-Decree on Water Quality	<ul style="list-style-type: none"> ▪ Limit work in channels to low flows. Diversionary works to be completed in dry season 	Contractor	PMU-SEO/DDIS
FUEL, LUBRICANTS AND ASPHALT	Loss of soil and water quality in contravention of MoE Praka No. 992 on the Regulation of Industrial Solid and Liquid Waste Management (1994)	<ul style="list-style-type: none"> ▪ Fuel storage in properly designed facilities, careful refuelling systems 	Contractor	PMU-SEO/DDIS/DoE
SOLID WASTE DISPOSAL	Loss of soil and water quality in contravention of Sub-Decree on Waste Management	<ul style="list-style-type: none"> ▪ Solid waste management procedures 	Contractor	PMU-SEO/DDIS/DoE
DUST NUISANCE	Loss of quality of life values in contravention of Draft Sub-Decree on Air Pollution Prevention	<ul style="list-style-type: none"> ▪ Road watering, cover stock piles 	Contractor	PMU-SEO/DDIS/DoE
NOISE NUISANCE	Loss of quality of life values in contravention of Draft Sub-Decree on Noise Prevention	<ul style="list-style-type: none"> ▪ Vehicle noise control, timing of work 	Contractor	PMU-SEO/DDIS/DoE
VIBRATION NUISANCE	Loss of quality of life values in contravention of Draft Sub-Decree on Noise Prevention	<ul style="list-style-type: none"> ▪ Schedule work to minimize nuisance 	Contractor	PMU-SEO/DDIS/DoE
DAMAGE TO SERVICES	Loss of services	<ul style="list-style-type: none"> ▪ Contractor liaise with utility company on location of services and local electricity suppliers such as pagodas on islands 	Contractor	PMU-SEO/DDIS/DoE
DAMAGE TO BRIDGES, PAVEMENTS AND FERRIES	Loss of access	<ul style="list-style-type: none"> ▪ Truck overloading must be controlled 	Contractor	PMU-SEO/DDIS/Police
ALTERED ROAD CONDITIONS	Driver hazards	<ul style="list-style-type: none"> ▪ Reduce waiting time delays; signage 	Contractor	PMU-SEO/DDIS/Police
INADEQUATE SANITATION	Increased disease in Contravention of Law on Environmental Protection and Natural Resource	<ul style="list-style-type: none"> ▪ Temporary camps to be in rented accommodation with existing sanitation, and extra water provided by tanker if 	Contractor	PMU-SEO/DDIS

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL IMPACTS/CONCERN	PROPOSED MITIGATION MEASURES	RESPONSIBILITY	
			IMPLEMENTATION	MONITORING
	Management (1996)	needed		
BEING READY FOR ACCIDENTS AND INJURIES	Slow response to injury, no treatment for illness	<ul style="list-style-type: none"> ▪ Use local labor as first choice ▪ Worker Health and Safety Plan, First Aid officer on site identifying nearest medical facilities 	Contractor	PMU-SEO/DDIS
TRANSMISSION OF SEXUALLY COMMUNICABLE DISEASES	Spread of diseases to communities	<ul style="list-style-type: none"> ▪ Pre-employment worker screening, Public Education Program 	Contractor	PMU-SEO/DDIS/DoH
STAGNANT WATER AREAS BREEDING HABITATS FOR MOSQUITO VECTOR	Siting camps distant to communities	<ul style="list-style-type: none"> ▪ Removal of stagnant water areas 	Contractor	PMU-SEO/DDIS
DISCOVERY OF ARTEFACTS AND RELICS – “CHANCE FIND”	Permanent loss of cultural items in contravention of Law on Protection of Cultural and National Heritage (1996)	<ul style="list-style-type: none"> ▪ Contractor awareness; inform MoCF 	Contractor	PMU-SEO/DDIS/MoCF
CONSTRUCTION NEAR RIVERSIDE	Loss of riverside vegetation	<ul style="list-style-type: none"> ▪ Avoid clearing riverside vegetation during road construction except where absolutely necessary ▪ Re-vegetate riverbanks where clearing is unavoidable 	Contractor	PMU-SEO/DDIS
CONSTRUCTION OF DETOUR ROADS	Blocking access for villagers during upgrading	<ul style="list-style-type: none"> ▪ Leave enough of a roadside edge for vehicle to pass on the other half of the roadway 	Contractor	PMU-SEO/DDIS
CONSTRUCTION NEAR VILLAGE WATER SUPPLY SOURCE	Encroachment on water supply systems from road construction activities	<ul style="list-style-type: none"> ▪ Contractors should pay a fee to villagers for damage to water system, perhaps based on number of days without water until the system is fixed. Fees might be specifically targeted toward women's groups, since they are usually the ones who will have the main burden of carrying water when the system is down 	Contractor	PMU-SEO/DDIS
CONSTRUCTION CAUSING AIR POLLUTION	Dust/Air pollution in contravention of Draft Sub-Decree on Air Pollution Prevention	<ul style="list-style-type: none"> ▪ Use water bowsers to water the road when dust occurs, particularly in the dry season ▪ Maintain all construction vehicles to minimize vehicle emission 	Contractor	PMU-SEO/DDIS
CONSTRUCTION CAUSING NOISE	Noise and Vibration in Contravention of Draft Sub- Decree on Noise Prevention	<ul style="list-style-type: none"> ▪ Avoid working at night near settled areas ▪ All road construction vehicles must have working mufflers and be properly maintained 	Contractor	PMU-SEO/DDIS
EXCAVATION OF BORROW PITS	Creation of stagnant water bodies in borrow pits, quarries	<ul style="list-style-type: none"> ▪ Incorporate adequate drainage and fill in borrow pits and quarries ▪ Maintain borrow pits and quarries by landscaping and re-vegetating after operation 	Contractor	PMU-SEO/DDIS
CONSTRUCTION CAMPS OPERATION	Generation of Solid waste in Contravention of Draft Sub-Decree on Waste Management	<ul style="list-style-type: none"> ▪ Provide garbage bins & sanitary facilities for workers. Waste in the bins should be cleared periodically ▪ Special attention should be paid to the sanitary condition of camps 	Contractor	PMU-SEO/DDIS

**ANNEX B:
ENVIRONMENTAL MONITORING PLAN**

Regulation	Environmental Issue	Parameter	Standard	Timing	Equipment	Institutional Responsibilities
SUB-DECREE ON WATER POLLUTION CONTROL	Water Quality	BOD	< 50mg/L	Every 3 Months or After Heavy Rain	Water Sampler	Contractor/PMU-SEO/DDIS
		SS	< 50mg/L			
		Temperature	<450° C			
		Ph	6-9			
		Oil & Grease	< 5mg/L			
		Dissolved Oxygen	> 4mg/L			
SUB-DECREE ON AIR AND NOISE POLLUTION CONTROL	Air Quality	TSP	< 0.33 Mg/M ³	24 Hours	Noise Meter	Contractor/PMU-SEO/DDIS
	Noise Quality	LEQ	75db(A)	(Daytime 0700- 1900H) in Response to Complaint and Quarterly		
		LEG	65db(A)	(Night Time 1900H-0700H)		
NO REGULATION	Vibration	Ppv	< 1mm/Sec	During Blasting Or Use Of Rotary Compactors	Vibration Meter	Contractor/Pmu-SEO/DDIS/MOE
SUB-DECREE ON SOLID WASTE MANAGEMENT	Solid Waste	Food Waste	Properly Removed	Daily	Visual Inspections	Contractor/PMU-SEO/DDIS/MOE
	Liquid Waste	Waste Oil, Grease	Properly Managed	Weekly		
NO REGULATION	Septic Tank	Smell, Sewage	No Smell, No Overflowing	During Operation	Visual Inspections	CONTRACTOR/PMU-SEO/DDIS
NO REGULATION	Borrow Pits	Condition of Borrow Pits	Filled After Project Completion, Topsoil Resurfaced	After Closure	Visual Inspections	CONTRACTOR/PMU-SEO/DDIS
NO REGULATION	Borrow Pits	Depth of Borrow Pits	No Drowning Hazard	After Closure	Visual Inspections	CONTRACTOR/PMU-SEO/DDIS
NO REGULATION	Borrow Road	Location for Borrow Road	Meet The Engineer Demands	After Closure	Visual Inspections	CONTRACTOR/PMU-SEO/DDIS
NO REGULATION	Quarries	Condition of Quarries	Quarries Reinstated	After Closure	Visual Inspections	CONTRACTOR/PMU-SEO/DDIS
NO REGULATION	Tree If Cut	Tree	Tree Replanted	After Removal	Visual Inspections	CONTRACTOR/PMU-SEO/DDIS

**ANNEX C:
CHECK LIST OF EMP IMPLEMENTATION**

Contract Package :
Inspection Date :

Inspector's Name :
Position :

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/Corrective Action	Deadline
	Yes	No	Partially			
1. Community Facilities (power lines, irrigation canals, etc.)						
Interruption of utility services are minimized by laying out new lines prior to transfer						
Replacement structure are constructed prior to demolition of existing structure						
Temporary facilities to maintain adequate services are in place						
Coordination with local company or local offices						
Affected parties are informed in advance						
2. Air Quality (Dust and Gaseous Emissions)						
Vehicles and equipment are well maintained and in good condition.						
Borrow areas, casting yard and other project facilities are duly licensed and have all the necessary environmental approvals						
All construction vehicles and equipment are tested for compliance with relevant emission standard and properly licensed						
Parked vehicles on the site works have their engines turned off. Unnecessary engine idling of vehicles and equipment is prohibited.						
Water spraying of roadways, working areas and other construction-related facilities near sensitive receptors and handling of all raw sand and aggregates, and other similar materials						
Dust barriers are installed as necessary						
Storage areas of construction materials such as						

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/ Corrective Action	Deadline
	Yes	No	Partially			
sand, gravel, cement, etc., have provisions that prevent them from being blown away towards sensitive receptors						
Trucks transporting construction materials (i.e. sand, soil, cement, gravel, etc) are tightly covered						
Roadways are regularly cleaned of tracked in mud, cement, etc. from construction works						
Stockpiling of spoils near sensitive receptors is prohibited						
Construction vehicles have speed limits (typically 25 km/hour or less) along areas where sensitive receptors are located						
Areas where there is a regular movement of vehicles have an acceptable hard surface and are clear of loose surface material						
Cement and other fine-grained materials delivered in bulk are stored in closed containers						
Conveyor belts are fitted with wind-boards, and conveyor transfer points and hopper discharge areas are enclosed						
Weigh hoppers are vented with a suitable filter						
Wheel washers are used to clean delivery/ haul trucks of mud and dirt as they exit the work area						
Smoke belching vehicles and equipment are not used for the project						
Construction vehicle trips and travel distances for material deliveries are minimized (e.g., by using local materials and labor sources).						
Construction access roads are temporarily paved or sealed						
3. Noise Levels						

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/Corrective Action	Deadline
	Yes	No	Partially			
Prior notification to the community on construction schedule						
Vehicle and equipment are fitted with emission control and silencers to meet national noise standard						
Vehicles and equipment are well-maintained and checked by the contractor every 6 months						
Only vehicles and equipment that are registered and have necessary permits are used						
Noisy equipment are completely enclosed whenever possible						
Stationary equipment that produce high noise level are positioned as far as is practical from sensitive receptors.						
Noisy construction activities within 200m of a settlement are only during daytime						
Suitable noise control barriers are used in the vicinity of house, school, temples, medical facilities and other sensitive receptors						
Noisy construction activities are avoided near school during examination period and coordinated with school administration						
Noisy construction activities are avoided in the vicinity of sensitive receivers						
Suitable noise level reduction measures are installed by the contractor if construction activities are disruptive						
Speed limits on construction vehicles are imposed						
Construction traffic routes are defined in cooperation with local communities and traffic police						

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/Corrective Action	Deadline
	Yes	No	Partially			
Asphalt concrete batching plants and crushing plant are located at least 500 m away from inhabited areas and other sensitive receptors						
4. Vibration Levels						
Fully loaded trucks are rerouted away from roadways that go through heavily built areas						
Heavy equipment are operated away from vibration-sensitive areas						
Simultaneous activities like demolition, ground impacting and earthmoving are avoided						
Alternative equipment is used						
Use of vibrating rollers near vibration- sensitive structures are avoided						
5. Erosion and Sedimentation						
Suitable soil erosion control measures are implemented prior to excavation of the bridge pier foundation and construction activities at waterways						
Silted water carried with the spoils during excavation and construction of bridge foundation are properly treated						
Spoils (excavated soil, rocks, removed asphalt, etc.) stockpiles are located at least 50 m from watercourses						
A bund is placed around the spoils stockpile area						
Spoil disposal does not cause sedimentation and obstruction of water flow, damage to agricultural land and densely vegetated areas						
Grading is avoided or minimized during the rainy						

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/Corrective Action	Deadline
	Yes	No	Partially			
season particularly in areas of steep topography and/or adjacent to water courses						
Phased grading schedule is implemented to limit the area subject to erosion at any given time						
Appropriate erosion control and stabilizing measures (such as geotextiles, mats, fiber rolls, soil binders that are not toxic to the environment, or vegetation measures/temporary landscaping) are used in disturbed areas and on graded slopes						
Construction works (for bridges, culverts, drainage, etc.) on or near watercourses do not cause obstruction of channel flow						
Slopes along water channels are stabilized						
Dumping of soil, rocks, construction materials and debris onto watercourses is prohibited						
When construction works cause obstruction of watercourses, the obstruction is immediately cleared to restore channel flow						
6. Spoils Disposal						
Spoils (excavated soil and rocks, cut vegetation, removed pavement such as asphalt, etc.) are immediately transported to disposal sites approved by local authorities						
Temporary spoils stockpiles near paddy fields have bund or silt fence around them						
Temporary spoils stockpile that are planned to be used longer than six months are sodded.						
Height of spoils stockpile are limited to minimize windblown dust						
7. Soil and Groundwater Contamination						

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/Corrective Action	Deadline
	Yes	No	Partially			
Maintenance shops, fuel and oil depot have impermeable flooring with sump						
Refueling and servicing of equipment are carried out only in adequately equipped areas						
Only minimal chemicals, hazardous substances and fuel are stored on site works, within an enclosed and covered secure area that has an impervious floor and impervious bund around it						
Storage area for chemicals, hazardous substances and fuel are located away from watercourses, flood-prone areas, work camps, and danger areas						
Oil-stained refuse such as oily rags, spent oil filters and used oil are collected and disposed of through recyclers/authorized waste handlers and disposed in authorized waste facilities						
Availability of spill clean-up materials specifically designed for petroleum products and other hazardous substances						
Immediate cleanup of spills or leaks of petroleum products and/or hazardous substances						
Training of relevant construction personnel in handling of fuels/hazardous substances and spill control procedures						
At least weekly check for leakage in containers and immediate repair or replacement when necessary						
Equipment maintenance and fuel storage areas are provided with drainage to an oil-water separator that is regularly skimmed of oil and maintained						
Discharge of oil-contaminated water into the						

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/Corrective Action	Deadline
	Yes	No	Partially			
environment is prohibited						
Waste oil, used lubricant and other hazardous wastes are stored in tightly sealed containers with proper labeling						
Removal and treatment or proper disposal of oil contaminated soils is included in work sites restoration						
8. Water Availability						
Temporary canals /irrigation channels to prevent disruption of water supply to farmlands.						
9. Water Quality						
Suitable settling/retention ponds are constructed prior to operation of asphaltic concrete batching plants and casting yards						
Settling/retention ponds are properly operated and maintained to ensure effluent quality meets applicable effluent standards						
Bentonite slurry and sludge, mud and other materials and wastes from drilling are collected and processed to avoid pollution of surface water						
Bentonite slurry and sludge, mud and other materials and wastes from drilling are not discharged into watercourses						
Drilling solutions (e.g., bentonite slurry) for bridge construction, abutment construction, piling, etc. are processed in a closed system						
Proper disposal of bentonite-containing spoils as fill material in appropriate sites						
Spilled bentonite mud in agricultural land is						

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/Corrective Action	Deadline
	Yes	No	Partially			
cleaned immediately before it cakes and hardens						
Water from bridge foundation dewatering is not discharged directly into a water body						
Total suspended solids content of discharges into water bodies comply with applicable standards						
Sanitation facilities with sufficient capacity are provided to handle and treat sewage generated by workers						
Equipment service and maintenance yards are provided with impermeable flooring and collection sump						
All equipment maintenance shops are provided with water-tight receptacles for waste oil, oily rags, spent oil filters, solvents and oily containers						
Disposal of all waste oil, oily rags, spent oil filters, solvents and oily containers are through authorized waste handlers and recyclers						
Paving operations are restricted during wet weather						
Use of sediment control devices downstream of paving activities						
Use of mobile fueling/maintenance units for construction equipment whenever feasible						
Accurate and up-to-date written inventories and labels for all stored hazardous materials						
Use of berms, ditches, and/or impervious liners, etc. in material storage, vehicle/equipment maintenance and fueling areas						
Material storage, maintenance and fueling areas and septic systems are at least 30 m from storm drains and surface waters						
Facilities for solid and domestic liquid waste						

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/Corrective Action	Deadline
	Yes	No	Partially			
management are used and maintained						
10. Solid Waste						
Garbage bins and temporary storage facilities for construction wastes, domestic solid wastes and segregated wastes are provided within the project site						
Waste segregation (hazardous, non-hazardous, reusable) is practiced						
Regular collection and disposal of wastes (by contractor or authorized third party) to sites approved by local authorities						
Wastes are not dumped into watercourses, agricultural land and surrounding areas						
11. Borrow Pits						
Borrow areas are not located in productive land, forested areas and near water courses such as rivers, streams, etc.						
Topsoil are properly removed, stockpiled and preserved for later use during site restoration and provision of vegetation cover to minimize erosion						
Stable side slopes are provided during excavation of the borrow pits						
Quarry sites lying on small rivers and streams are avoided						
Quarry sections located on the river bed are avoided or reduced if unavoidable						
Borrow pits are left in a tidy state with stable side slopes and proper drainage						
Quarry sites and borrow pits are restored and						

EMP Requirement (Mitigating Measures)	Compliance Status			Remarks/Reasons for Partial or Non-Compliance	Recommendations/Corrective Action	Deadline
	Yes	No	Partially			
rehabilitated after use						
12. Traffic Management and Local Access						
Signs advising that construction is in progress are provided, particularly where the alignment crosses existing roads and where construction related-facilities are located						
Flag persons are employed to regulate traffic especially in potentially hazardous areas						
Traffic advisory signs (to minimize traffic build-up) are posted in coordination with local authorities						
Sufficient lighting at night within and in the vicinity of construction sites are provided						
Regular monitoring of traffic conditions along access roads to ensure that project vehicles are not causing congestion						
Schedules are observed for different types of construction traffic trips (e.g., transport of pre-cast sections, haulage of spoils, delivery of construction materials, etc.)						
Delivery of construction materials and equipment and transport of spoils are during non-peak hours						
Interactions between construction works, traffic flows and pedestrians are minimized by the following safety measures: <ul style="list-style-type: none"> • Temporary signals or flag controls • Adequate lighting • Fencing • Signage • Road diversion • Traffic cones 						

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	Yes	No	Partially			
• Barricades						
Use of escort vehicles and warning signs/lights to increase public awareness of potential hazards						
Construction activities and schedules are coordinated in advance with local agencies, community representatives, businesses, schools						
Existing access routes are maintained (whenever feasible)						
Provision of alternative access and/or parking when impacts to principal access routes and parking areas cannot be avoided						
Adequate informational and directional signage to improve alternative access function						
Construction operations are scheduled to avoid or minimize conflicts with local uses/activities						
At least one safe through lane is maintained at all times in construction areas						
13. Damage to Properties and Community Facilities						
Local roads used by the project are upgraded prior to use						
Local and access roads used by the project are repaired and maintained regularly and fully restored at the end of the project						
Contractor immediately repairs and/or compensates for any damage to properties						
14. Accidental Discovery of Artefacts						
Immediate stoppage of operations on road section where artifacts/ archaeological finds are unearthed; contractor informs the DDIS and CIPM						

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	Yes	No	Partially			
CIPM notifies Ministry of Culture and Information (MCI) to obtain advice regarding the next steps						
Work is resumed only after MCI has provided official notification						
15. Occupational Health and Safety						
Orientation for construction workers regarding health and safety measures, emergency response and prevention of HIV/AIDS and other diseases						
Workers at the bridge site are provided with life vests/buoyancy devices at all times						
Stable footpaths/access with sturdy guardrails to the bridge work sites shall be provided						
Preparation and implementation of a waterway safety plan, approved by the agencies in charge						
Contractor complies with the waterway traffic safety during construction						
First aid facilities that are readily accessible to workers						
Fire-fighting equipment at construction camps and work areas, as appropriate						
Adequate drainage in workers' camps						
Adequate and clean housing and sanitation facilities for all workers at the workers'/ construction camps						
Separate sleeping quarters for male and female workers						
Reliable supply of water for drinking, cooking and washing purposes at the workers' camps						
Separate hygienic sanitation facilities/toilets and						

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bathing areas with sufficient water supply for male and female workers						
All wastewater from workers' and construction camps and project-related activities/ facilities are treated consistent with national regulations						
Proper collection and disposal of solid wastes within the workers'/construction camps						
Sturdy fencing on all excavation areas greater than 2 m deep						
Workers are provided and use appropriate and complete safety equipment such as safety boots, protective clothes, breathing mask, ear protection, helmets, gloves, etc.						
Reversing signals are installed on all construction vehicles						
Fall prevention and protection measures whenever a worker is exposed to the hazard of falling more than two meters, falling into operating machinery or through an opening						
16. Public Safety						
Signage are installed at the periphery of the construction site to warn and direct traffic and pedestrians						
Security personnel are deployed in hazardous areas to restrict public access						
Speed limits are imposed on construction vehicles along residential and other sensitive areas (typically 25 km per hour)						
Drivers are taught safe driving practices to minimize accidents and prevent spill of hazardous and other construction materials						

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	Yes	No	Partially			
during transport						
Safe access to properties and establishments affected by construction works						
Safe passageways for pedestrians crossing the construction site						
Excavated areas are immediately backfilled, covered (e.g., with metal plates) and/or repaved						
All construction vehicles and equipment are secured during non-working periods to prevent unauthorized access or use						
Appropriate safety barriers and warning signs are installed in areas that pose safety risks such as open excavations, cut slopes, erosion-prone slopes, manufactured slopes, drainages, etc.						
17. Flora and Fauna						
Vegetation removal is coordinated with forest authority						
Tree-cutting permit is secured, as necessary						
Tree planting and landscaping plan that includes: <ul style="list-style-type: none"> • Inventory of the number of species of trees proposed for removal • Identifying and documenting quantity, variety, and location of replacement trees • Replanting at the outer portions of the ROW and in other locations agreed with local authorities • Monitoring and maintenance program to ensure effectiveness of the plan • Adopting remedial measures where appropriate (e.g., replacing dead or damaged 						

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replanted trees)						
Clearing of trees is limited to areas that are only necessary based on the project design and as approved by the forestry department						
Cutting of trees for firewood and for use in project is prohibited						
New alien plant species are not used for replanting/revegetation without an existing regulatory framework						
Invasive species are not introduced into new environments						
Workers are prohibited from hunting wild animals and collecting forest products						
Bridge works are scheduled in dry season to minimize adverse impacts to aquatic resources						
Contractors do not buy or use wood from illegal sources (illegal logging)						
No construction camps, asphalt mixing plants, material storage sites and other construction facilities are located in protected areas						
Construction camps, asphalt mixing plants, material storage sites and other construction facilities are located at least 1 km from the boundaries of national parks and class 1A and 1B watershed designated areas						
Precautions are adopted to ensure that damage to vegetation is avoided should fires resulting from execution of the works occur						
Road improvement works are restricted to the existing ROW boundaries						
Grading methods and facilities i.e., rounding, benching, terracing and retaining walls are used						

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	Yes	No	Partially			
to reduce earthwork and related topographic alteration/vegetation removal						
Suitable wildlife crossing structures are installed at locations agreed with the park management boards and National Environmental Board						