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ENVIRONMENTAL PROTECTION REQUIREMENTS

1.0 PREAMBLE

These Environmental Protection Requirements must be read in conjunction with applicable plans for environmental management and/or for control of erosion and sedimentation prevention and the rest of the documents forming the Contract and in conjunction with all applicable laws and regulations in effect at the time of execution of the Works. The Contractor shall not be absolved from complying with any provisions contained within any one of these documents on the grounds that the requirements stated in one of the documents are not repeated in the other. Furthermore, in the event of conflict between these specification requirements and any pollution control or other environmental laws, rules or regulations of other National, regional or local agencies the more restrictive specifications, laws, rules or regulations shall apply.

The requirements contain approaches and protection measures to be implemented when dealing with environmentally sensitive areas such as wetlands and other aquatic resources, forest resources, wildlife habitats, heritage sites, coastal resources and local communities.

It is the policy of the National Works Agency (NWA) to protect the environment from adverse effects resulting from all alterations on the National Road Network (NRN). As the executing agency for programs related to the NRN, the NWA will enforce this policy requirements (as they pertain to construction and maintenance operations) as part of its Contract management, quality assurance, inspection and audit functions. The applicable environmental protection and pollution prevention measures captioned below shall be implemented to maintain the integrity of the natural and manmade environment.

This section sets out the minimum requirements for the environmental protection works. All subcontractors shall comply with the requirements of the Environmental Management Plan under the supervision of and responsibility of the Contractor.

2.0 ENVIRONMENTAL MANAGEMENT PLAN

The contractor shall prepare an acceptable Environmental Management Plan (EMP) and submit it to the Engineer /Supervisor for approval. The EMP shall define the Contractor's program and procedures regarding environmental conservation measures, etc. the EMP should address the following areas as a minimum.

- a) Dust control
- b) Noise pollution
- c) Surface water drainage and treatment from site facilities (workshops, asphaltic plant, concrete batching plant, crushing plant, fuel, oil, bitumen storage areas.
- d) Storage of materials (fuel & oil, fine materials, crushing & batching plants).
- e) disposal of waste materials
- f) Erosion and control of storm water
- g) Liaison with National Heritage trust
- h) Protection of Flora and fauna

The EMP should include descriptions of the proposed measures to be implemented; a programme that details the installation of erosion and water features and site-specific diagrams indicating proposed locations for such features. The EMP should take into account those requirements detailed in this section. In preparation of the EMP, the Contractor should make reference to the recommendations of the Environmental Assessment Report (March 2004).

3.0 CONSTRUCTION CAMPS AND STORAGE FACILITIES:

3.1 Construction Camps:

In accordance with Jamaican law, construction camps are subject to the provision of a license by the Ministry Of Transport & Works (MTW) and the National Resources Conservation Authority (NRCA), which will be granted on the basis of a detailed drawing and a plan of operations submitted by the Contractor. Such plan of operations shall show clearly how environmental and social impacts will be mitigated, including erosion and pollution controls, sanitation measures and restoration of camp sites.

The following mitigation measures shall, in general, be used to control pollution, erosion and other direct impacts at construction camps and storage facilities:

All sewage and waste water discharges shall be collected and treated in an approved system installed on site.

Solid wastes shall be stored in proper containers, collected and disposed of using public or private companies entrusted with solid waste collection in the communities / parishes where such wastes are collected (camp sites) and disposed in landfills/dumpsites approved by NEPA;

Erosion shall be minimized and sedimentation prevented through a drainage system with sedimentation traps and/or screens;

All hydrocarbon storage facilities shall be provided with collection traps and spillage berms;

All refueling and servicing areas shall be situated on impermeable surfaces served by an oil trap and run-off collection facilities; and

Trucks and earth moving equipment shall be equipped with functioning back-up warning devices;

Upon completion of the Contract, all elements of the camp shall be removed and the site, as far as possible, be returned to its original condition unless designated for alternative uses with approval of the MTW and NRCA.

The Contractor(s) will provide medical examinations and emergency medical care for the construction crew and will provide suitable and clean sanitary facilities and necessary safety equipment, including special masks covering nose and mouth, for employees when applicable. The Contractor(s) will also provide clean potable water, food and housing when necessary.

The burning of materials where unavoidable in open air shall be done under strict supervision of the contractor's qualified staff and in accordance with the countries fires act The Contractor shall not burn tires, asphaltic materials, oil or any materials that will produce dense smoke, either for the purpose of incineration or to augment the burning power of other matter. Extreme caution shall be taken to dispose of materials so as to avoid damage or destruction to private property or to cause excessive air pollution.

3.2 Storage Facilities

The Contractor shall at all times take every possible precaution against contamination of the Works, the Site or surrounding areas. All temporary and permanent fuel and oil storage areas shall be above ground and isolated within an impermeable bunded area. The volume of the bund shall not be less than the total stored volume capacity. Drainage from such bunded areas shall incorporate oil separators before discharge to existing watercourses. All workshop and equipment storage areas shall be drained such that all surface water runoff passes through an oil separator prior to discharge into watercourses.

A spill contingency plan shall be prepared before the commencement of site activities and the necessary clean-up agents and equipment in place. All site workers shall be made aware of the

emergency planning measures and selected staff should be trained in the handling, storing and disposal of hazardous and polluting substances.

Stockpiles of fine materials (e.g. topsoil, cement, sand) shall be covered to prevent the wind erosion of the stockpiles. Such coverings shall be used during periods of inactivity, when access to the stockpile is not required. This includes covering at the end of each working day.

The Contractor shall propose, and adopt, methods for reducing dust arising from the operation of any batching plant or crusher plant. The method of dust suppression shall be to the satisfaction of the Engineer.

4.0 ENVIRONMENTAL SPECIFICATIONS – CONSTRUCTION METHODS:

4. 1. POLLUTION CONTROL

The Contractor will take all precautionary measures throughout the duration of the Project to prevent the contamination of water courses, aquifers and the marine environment by pollutant wastes such as chemical products, fuel, lubricants, sewerage water, silt or other obnoxious material.

Waste water to be discharged from construction facilities must first be filtered or otherwise treated to eliminate obnoxious material likely to cause pollution into natural watercourses or aquifers or endanger indigenous flora and fauna. No waste water or other liquid or obnoxious material will be dumped on wetlands or breeding grounds of aquatic birds.

If by accident the contractor dumps, discharges or spills any fuel or chemical product likely to contaminate any watercourse or aquifer, the contractor will immediately take action to arrest and eliminate the pollution caused thereby. The Contractor shall maintain written records of any such incident and of the mitigation measures implemented.

In the demolition of existing structures and the construction of new ones, the contractor shall ensure that no rubble or other surplus construction material is dumped into existing watercourses or aquifer recharge areas.

Construction activities on water courses or over aquifers or aquifer recharge areas will be confined to the areas shown in the final design drawings and where the erection of temporary or permanent structures have been so designated. Temporary fills and scaffolding or false works erected for the undertaking of construction works will be removed from river or watercourse beds immediately upon termination of the construction activities at such locations.

Frequent crossing by construction equipment over watercourse beds during construction activities will not be permitted. If and when needed, temporary structures will be erected to allow crossings. The use of silt, sand or similar fine graded material which could cause turbidity or sedimentation in the stream shall not be permitted in the construction of stream crossings.

4. 2. NOISE CONTROL:

The Contractor shall use every effort and every means possible to minimize noises caused by his operations. The Contractor shall provide working machinery and equipment designed to operate with the least possible noise, including the use of shields, soundproof housings, enclosures, or other physical barriers to restrict the transmission of noise, and when gearing is used, such gearing shall be a type designed to reduce noise to a minimum. Compressors shall be equipped with silencers on intake lines. Gas or oil operated equipment shall be equipped with silencers or mufflers on intake and exhaust lines. Wherever practicable, electricity shall be used for power to reduce noise, unless otherwise stipulated in these Specifications.

Allowable sound levels for mobile construction equipment shall not exceed 85 dBA. For stationary construction equipment, the level allowed shall not exceed 70 dBA. Operation shall be restricted to the hours of 7 A.M. to 10 P.M., Monday through Saturday unless otherwise approved by the Engineer. Sound levels for employee noise exposure will be measured at the employee's normal work station, and shall not exceed the following limits:

Sound levels for public noise exposure due to construction will be measured at the closest point adjacent to the site in normal use by the public while construction work is in progress, and three (3) to six (6) metres from building lines affected by noise. Allowable sound levels for mobile construction equipment and stationary construction equipment between the hours of **7 A.M. to 10 P.M.**, Monday through Saturday are respectively, **85 dBA** and **70 dBA** and at all other times respectively, **70 dBA** and **60 dBA**.

- (a). The Contractor(s) will comply with the following construction noise standards with the exclusion for blasting:

CONSTRUCTION NOISE STANDARDS			
Time	Noise levels in dBA	Noise levels in dBA	Noise levels in dBA
	L₁₀	L₉₅	L_{max}
0530-0730	60	45	70
0730-2000	70	55	85
2000-0530	55	40	75

- * The Contractor(s) will keep equipment in such conditions that they comply with the following maximum criteria

NOISE FROM CONSTRUCTION EQUIPMENT		
EQUIPMENT	TYPICAL NOISE (dBA)	RANGE (dBA)
Portable Air Com-pres-sor	81	74-87
Concrete Mixer	85	81-89
Jackhammer	88	81-89
Pneumatic Tools	85	82-89
Generator	76	71-82
Pile Driver	101	95-106

- * The Contractor(s) will use the correct equipment for each job in order to minimize noise intrusion.
- * (In populated or urban areas all noisy operations such as piling, transportation of material, earthworks and bulldozing will be carried out during daylight hours (0730 - 2000) only.
- * Blasting will only be carried out once a day, at a time set in consultation with the residents of the nearest by community.

4.3 DUST CONTROL:

The Contractor shall take appropriate measures to minimize the generation of dust as a result of his works, operations and activities to the satisfaction of the Engineer.

Such measures shall include regular and effective treatment of gravel roads and working areas, use of dust extractors on drilling equipment or wet drilling equipment or wet drilling, water sprays on aggregate crushing and screening plants, etc. Dump trucks to be used in the transportation of materials are to be fitted with tarpaulins to prevent dust or other material spilling during operation.

4.4 REMOVAL OF MATERIAL:

The Contractor shall dispose of surplus and waste materials in places approved by the Engineer. Such areas or places can be selected by the Contractor at his choice but following strictly the criteria and procedures laid down in the legislation (The Main Roads Act, Art. 20, 21, and 22, etc.) The Contractor shall not deposit surplus or waste materials in watercourses or open areas. To the extent possible, surplus material shall be used in the Works, if the quality so warrants.

The dump trucks to be used in the transportation of surplus material should be fitted with tarpaulins to prevent dust or other material spilling during the haul.

The Contractor shall not dispose of used pavement material on the road or highway side, nor in watercourses or wetlands. Such materials shall be disposed of in places approved by the Engineer.

Asphaltic cement removed from the site should be re-used or disposed of in a controlled manner in places approved by the Engineer.

Whenever large amounts of asphaltic material are to be removed from a road or highway, the material shall be reused, if so provided in the plans, hauled to an approved facility for processing and future reuse, or disposed of by burial, at least at one meter depth, outside the project site and urban settlements at a location approved by the Supervisory Firm or other authorized representative of the NWA. However, old and out-of-service roads can be utilized as disposal areas, provided that it is determined and documented on the project permanent records that pollution risks are minimal, and with previous authorization of the Supervisory Firm or other authorized representative of the NWA.

4.5 BORROW AREAS AND QUARRIES:

In accordance with Jamaican law, the use of any borrow areas for the purpose of this Contract is subject to the provision of a license by the Department of Mines and Geology, which will be granted on the basis of a quarry or borrow area management plan submitted by the Contractor. Such plan must clearly show how environmental impacts will be mitigated, including erosion prevention and after-use restoration. Borrow sites and quarries must be assessed for environmental impact before use and a report should be submitted to NWA and NEPA.

The following mitigation measures shall be generally used to control erosion and other direct impacts at borrow sites and quarries:

- * Cover gently sloping or flat borrow areas with top soil after termination of the use of the site;
- * Contour shape embankments to slow the rate of water run-off;
- * Provide for good borrow site management practices in contracts with private site operators.

The Contractor shall not extract river stone, gravel, sand or any other construction material from watercourses without the approval of the Engineer. The Contractor should also obtain the necessary permits from the relevant Governmental authority.

5.0 ASPHALT, CONCRETE AND CRUSHING PLANT

Where applicable, the Contractor shall install the asphalt, concrete and crushing plants in flat land, cleared of organic topsoil and with suitable access for vehicles. The locations shall be approved by the Engineer, which shall not be near urban or other settlements. The installations shall provide adequate storage space for raw and surplus materials, and ample space for traffic circulation to prevent hindrance to loading and unloading operations.

The production plants shall be adjusted to operate in such a manner that, to the extent possible, dust and fumes discharge are kept to a minimum. The plant shall be kept free of human and construction debris and storm water run-off shall not carry contaminants to adjacent watercourses, wetlands or sensitive vegetation. Special measures should be taken to ensure that storm water run-off is adequately treated to prevent the export of contaminants. Such measures may include stilling ponds, silt traps and oil interceptors.

In transportation from the plants, trucks shall be fitted with adequate devices to prevent material spillage.

6.0 EROSION CONTROL AND STORMWATER MANAGEMENT

Measures to prevent erosion resulting from concentration or increase in flow of stormwater caused by the presence of the Works is included in the design of the Permanent Works. The Contractor shall take appropriate and active measures to prevent erosion resulting from his own works, operations and activities which shall be to the satisfaction of the Engineer even when such potential erosion may take place or actually does occur beyond the limits of the Site. Such measures shall include providing, installing, maintaining, removing and disposing of erosion control measures such as gravel filter berms, dykes, catch basin inlet protection, end of pipe filtering devices, silt fences, dams, sediment basins, netting, bale barriers, slope drains and other erosion control devices or methods. Typical measures of erosion and stormwater control are indicated on the appendix of the EAR March 2004.

7.0 PROTECTION OF BIOLOGICAL RESOURCES

7.1 VEGETATION:

The Contractor(s) will reduce loss of vegetative cover, erosion and sedimentation to the minimum possible by:

- * Avoiding any off-the road driving outside the immediate construction areas;
- * Keeping process areas as small as possible;

- * Reducing damage to vegetation through environmentally sound construction practices; giving special importance to the preservation of trees, particularly large trees of genetic and landscape value;
- * Where roadside banks are cut and exposed, protecting the banks from gully erosion and sedimentation into nearby streams.
- * Providing sediment traps and screens where needed;
- * excavating bulk fill from areas so as to minimize erosion, reduce visual impact of scarring and allow for rapid revegetation following excavation; and
- * Reusing organic topsoil

The Contractor(s) will restore ground cover as soon as earthworks permit, and will take the necessary measures to promote regeneration of native vegetation, even if such measures may not be immediately clear from the final designs. These measures may include the use of degradable geotextile, the use of seeds or live stakes of native grasses, revegetating with local shrub and tree species (especially those characterized by rapid growth and deep roots) and the reuse of top soil and mulch. The Contractor(s) will replant shade trees and screening vegetation, as designated in the specific environmental mitigation plan.

To avoid erosion and gullying of banks, the Contractor(s) will refrain from earthworks during the peak of the rainy season, use gabions and miter drains, and will avoid angle termination at the borders of cuts and fills.

The Contractor(s) will build temporary and permanent silt traps where there are perennial streams and the likelihood of other usage downstream, using appropriate materials and techniques, including settling ponds, silt fences, filter cloths and detention ponds, even if such measures may not be immediately clear from the final designs.

The Contractor(s) will minimize earthwork in the where possible at these bridges; work from banks rather than from stream beds and in general reduce contact with watercourses to the minimum. On all bridge approaches the Contractor(s) will sow the faces exposed to inclement weather with local grass or with other local species, especially those that are adapted to local conditions and which grow rapidly and have deep roots.

7.2 FAUNA

The Contractor shall protect fauna living within the Site and shall ensure that hunting, trapping, shooting, bird-nesting or egg-collecting does not occur. Certain species of birds in the region are known to be rare and endangered. The Employer will identify such species to the Contractor, who shall take steps to inform his employees that such species of birds are to be protected. Only licensed fishermen will be allowed to fish and then only in approved locations.

8.0 ARCHAEOLOGICAL/CULTURAL RESOURCES:

The Contractor shall allow archaeological and/or cultural inspections during construction to facilitate the protection of cultural and historical sites. Jamaica National Heritage Trust (JNHT) archaeologists will periodically monitor work and specific areas. Watching Briefs (guidelines for the Contractor) to assist in identifying sites will be prepared for critical areas. The Contractor shall assume that the unearthing of archaeological features will result in a work suspension in that area until features are recovered and/or the site is released by the JNHT.

9.0 BLASTING:

Blasting will be conducted in a safe manner with charges large enough to break up material, but not so large as to damage adjacent structures and threaten human safety from shock and debris. Blasting will take place only during daylight hours and at a time acceptable to affected adjacent parties.

10.0 PRIVATE LAND PERMIT

The contractor shall not dispose of any surplus material on private land unless authorized by the owner in writing, authenticated before a Notary Public, and with previous authorization of the Supervisory Firm or other authorized representative of the NWA.

11.0 COMMUNITY RELATIONS

The Contractor(s) shall follow a work schedule, procedures and rules of conduct conducive to good community relations during construction. This will entail adequate notification of work schedules for local communities and villages, and hiring practices which provide opportunities for local labor.

12.0 MONITORING

Monitoring of direct impacts will be carried out by the Supervising Firm (NWA) and shall include, but not be restricted to, the following concerns:

- * Assessment of dust control measures implemented by the contractor;
- * Measurement of noise levels arising from construction equipment and construction methods;
- * Measurement of air quality in general and pollution levels from construction equipment (exhaust in particular);
- * Assessment of surface water treatment implemented by the contractor
- * Verification that proper waste disposal at construction sites and road camps is carried out;
- * Verification that the construction sites and camps are cleaned after construction;
- * Monitor silting and increased sediment loads to streams which the bridges cross;
- * Installation of erosion control and drainage works (including silt traps);
- * Prevention of damage to undiscovered significant archeological or historical findings;
- * Inspection of vegetation cover (removal and re-growth) on the basis of yearly remote sensing and field examination;
- * Ensuring that Contractor(s) follows a work schedule, procedures and rules of conduct conducive to good community relations during construction.

Where necessary, the Supervising Firm (NWA) will provide a brief orientation to the Contractor and Staff on the environmental requirements.