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## 1.0 ENVIRONMENTAL MONITORING PLAN

### 1.1 Rationale and Background

The purpose of the Environmental Monitoring Plan (EMP) is to ensure that all rehabilitation and construction work undertaken under the Mabey Johnson Priority Bridge Program is environmentally sound, complies with Jamaican environmental laws and wherever possible satisfies the provisions of the Environmental Assessment Report.

This plan takes into account the mitigation measures highlighted in the Environmental Assessment Report and the environmental clauses and conditions. The primary concern will be to screen all new work proposals for potential environmental impact and to influence the design and implementation of these to ensure they are environmentally sound.

### 1.2 Approach

Environmental management objectives are as follows:

1. To screen all new works proposed under the project, rapidly assess impacts and comment as appropriate on environmental mitigation requirements. Assess contractor environmental plans and monitor performance in implementation, including health and safety practice.
2. To co-operate with the National Environment and Planning Agency, and advise and inform them on all matters relating to project due diligence, and to ensure that Jamaica's environmental requirements are met.
3. To assist in the identification design and implementation of environmental restoration works as part of the project.
4. To report to the NWA on all emerging and outstanding environmental management issues, and advice on mitigation and control of environmental risks, including health and safety.

The net result of the project should be positive. With environmentally aware management and sensitive contractor implementation, there is no reason why all environmental risk areas cannot be overcome or avoided, and maximum benefits achieved from environmental restoration and enhancement works undertaken.

Attention to occupational health and safety, as well as environmental health, are key aspects of good quality environmental performance. Selected areas of necessary management activity are reviewed in the paragraphs below. The NWA's Occupational

Health and Safety Guideline document is included in the appendix as aid to the contractor.

### **1.3 Modalities for Environmental Management and Monitoring**

The Environmental Monitoring Unit (EMU) of the NWA will be responsible for implementation of appropriate management and monitoring of project works. During the project planning stages the Design and Supervision Consultant must take due account in their designs and specifications of areas deemed to be environmentally sensitive because of:

- a) The fragility/ecological importance of the location, to the water body/rivers or conservation/heritage structure.
- b) The nature of the works envisaged, e.g. major changes to the environment, new use of borrow/quarry areas or potential for pollution from wastes or risks of technologies employed.

The EMU will keep the National Environment and Planning Agency informed of environmentally sensitive sites and will request their input to ensure compliance with all environmental regulations.

The EMU will undertake the environmental monitoring tasks as set out below. The EMU will complete environmental monitoring forms every month for all work sites and will submit these to the NWA and on a monthly basis for review and comments.

Project monitoring forms will be reviewed and updated as necessary and, where possible, designed to be related directly to project activity type. Outstanding environmental concerns will be addressed in monthly and quarterly project reports, and to the National Environment and Planning Agency.

### **1.4 Environmental Policy Statement**

Given the importance of environmental issues at most construction sites, the Environmental Policy Statement of the NWA will be issued in the EMP guidelines for reference. The main concerns of the policy are as follows:

***It is the policy of the National Works Agency to protect the environment from adverse effects resulting from all alterations on the national road network. We are committed to:***

- \* ***Implementing best environmental management practices, in order to meet or exceed applicable legal and other requirements;***
- \* ***Strive for continual improvement in our environmental management system to minimize the creation of wastes, depletion of the environment and pollution.***

- \* *Manage our processes, our materials and our people in order to reduce the environmental impacts associated with our work;*
- \* *Implementing and operating an Environmental Management System to further improve environmental performance and enhance the environment.*

*We will conduct routine environmental monitoring audits throughout the construction period to ensure that this policy is implemented. Where non-compliance is observed, corrective measures will be formulated and implemented accordingly.*

## **2.0 Environmental Monitoring Tasks**

### ***(2.1) Review of Contractor's Plant and Facilities***

Any facilities to be installed by the Contractor for the purpose of conducting the construction works need to be approved by all relevant governmental agencies prior to the implementation of any of the works. They will be assessed on the fulfillment of required environmental impact mitigation criteria. Particular attention will be paid to:

- 1) Noise abatement devices on construction and support equipment present on the site with the objective of keeping the noise level within the acceptable construction noise standards as per contractual obligations and standards of the Pollution Regulations.
- 2) Proper equipment of construction camps, storage facilities, health and safety.
- 3) Adequate facilities for collection and treatment of waste water, storage and disposal of solid waste.
- 4) Drainage systems including sedimentation/silt traps.
- 5) Adequate location and protection of refueling facilities, storage of hydrocarbons.
- 6) Adequate location for plants with storage space for raw and surplus materials.
- 7) Provisions and facilities for minimal discharge of fumes and dust.
- 8) Pump trucks equipped with devices to prevent material spillage.
- 9) Approval of borrow pits, disposal and dumping areas where applicable.

## **(2.2) Construction Traffic**

The Contractor's arrangements for managing construction traffic will be continually reviewed. The site inspection team will be alert to the possibility of construction traffic causing pavement and structure damage due to overloading, increase in congestion and increased road safety hazards.

Arrangements such as plant mud reduction such as wheel washing or construction entrance/exit cleaners, or similar, for ensuring that mud is not deposited onto public highways will be regularly inspected. In the event that the contractor does cause damage to any road, he will be required to repair this at his own expense as provided for in the Contract.

## **(2.3) Noise Nuisance**

The level of noise nuisance from construction plant operation will be monitored. The Contractor will be required to use only plant which meets specified noise parameters, as stated in the contract documents. No driven piling works will be permitted within specified distances of noise sensitive premises unless 'silent' driving plant is employed. In general it is anticipated that no piling works will be permitted to be undertaken outside daylight hours

## **(2.4) Water Abstraction**

The Contractor's arrangements for obtaining water will be monitored to ensure that these do not result in competition for scarce water resources with local users. In general, by reference to appropriate clauses in the contract, the contractor will be required to make suitable arrangements for his own supply, and to provide an alternative supply to any users affected by abstraction.

## **(2.5) Site Safety**

The Contractor will be required to appoint a Safety Officer/Traffic Management Co-ordinator, who will be involved in drafting (using the NWA's guidelines) the Contractor's Health and Safety Plan to include some or all of the following:

Temporary works

1. Pre-stressing/post-tensioning works
2. Pile driving
3. Batching plants/crushers
4. Working in or near water
5. Working at heights
6. Working in confined spaces

7. Interaction with the general public, especially road users and adjacent property owners/occupiers.
8. Traffic management
9. Disease control

The EMU in conjunction with the Engineer will ensure that the supervising staff vet the Contractor's plan and ensure that it is enforced.

### **(2.6) Disposal of Waste Materials**

The Contractor's disposal of materials within the site boundary and at off-site locations will be monitored to ensure that appropriate consideration is given to proper disposal of all waste materials.

The methods of, and sites for, the disposal of hazardous and environmentally damaging materials must be approved by the National Solid Waste Authority's area agent prior to any such disposal. The disposal of all other waste materials will be disposed of only at officially designated sites.

In the event that any spillage of, or accident with, any hazardous or environmentally damaging material has occurred, or is likely to occur, NEPA will be notified immediately.

Full assistance will be given to the staff from NEPA who will be responsible for ensuring compliance with existing regulations and environmental technical specifications.

### **(2.7) Approval of Contractor's Workmanship**

The adequacy of the Contractor's workmanship to the requirements of the Environmental Specifications of the contract documents will be verified. In particular, attention will be paid to the need to:

- 1) Avoid extraction of river run stone from water beds whenever possible, and in any case without prior authorization.
- 2) Avoid excavating borrow pits and ditches on lands with insufficient runoff drainage, or located in the vicinity of populated areas
- 3) Avoid dumping construction material in water courses
- 4) reduce damage to vegetation to the strict necessity imposed by sound construction practices
- 5) Refrain from creating earthworks during the peak of rainy seasons, and implement engineering practices to avoid erosion
- 6) Promote the re-use of removed materials or disposed of where possible;

- 7) Organize works and optimize transport of materials in order to minimize negative impacts on local communities.

### **(2.8) General Effects**

Method statements and environmental mitigation plans prepared by contractors will be reviewed regarding amongst other things:

1. Sourcing and transportation of materials
2. Storage of material at site
3. Movement of vehicles to and from site, and during work at site
4. Construction practice affecting:

- \* *Erosion Control*
- \* *Noise and Vibration*
- \* *Waste Management/minimization*
- \* *Contaminated Materials and Wastes*
- \* *Emergency Response Procedures*
- \* *Air Quality*
- \* *Water Quality*
- \* *Litter*
- \* *Storage of Chemicals and Fuels*
- \* *Cleanliness of the road from mud etc from site traffic;*
- \* *Hours of work in the vicinity of dwellings;*
- \* *Movement and generation of surface water;*
- \* *Pedestrian and vehicle diversion and safety;*
- \* *Siltation and blockage of drains and river courses; and,*
- \* *The level of monitoring to be undertaken.*

Recommendations will be made regarding any modifications that are necessary to achieve the desired level of environmental protection.

Throughout the construction period, regular site inspections will be made to monitor the effectiveness of environmental protection measures, as well as to check that no previously unforeseen impacts are occurring. In the event of the latter, recommendations will be made for additional environmental protection measures to be adopted.

The frequency of site inspections will vary depending on the nature of works being carried out at any one time. In general, attention will be concentrated on those operations and locations where the most potentially damaging impacts might be anticipated, with particular attention being paid to earthworks sites, riverbank sites, and all areas where possible wetland impacts could occur.

The frequency of inspection will be highest at the initiation of works at each site, so that any problems can be recognized at an early stage, and remedial works or procedures can be implemented before irreparable damage has occurred. Particular attention will be paid to checking that no undue erosion and sedimentation problems are occurring, and that all temporary measures such as silt traps are functioning efficiently.

### (2.9) Pollution of Watercourses

The Contractor's approved environmental management plan will be reviewed against site activities to ensure that pollution of watercourses does not occur.

Pollution of land, groundwater and surface water arising from sanitary and other wastes is a potential impact which must be covered in the Contractor's plans. This will make provision for the safe disposal of all wastes and prevention of spillages, leakage of polluting materials etc.

All bank and in-stream river works are to be carried out behind cofferdams to prevent disturbance to watercourse flows and adverse effects on water quality. Silt bearing water pumped from the cofferdam shall be diverted through an effective silt trap prior to discharge into the watercourse.

The contractor will be required to pay all costs associated with clearing up any pollution caused by his activities, and to pay full compensation to those affected.

### (2.10) Erosion of Earthworks

The Contractor's operations will be continuously reviewed to prevent erosion of earthworks leading to pollution of water bodies and deterioration of the earthworks themselves, the road shoulders and the pavement.

The earthworks specifications and Bills of Quantities will include provision for protection of all earthworks slopes including watering of laid turf or seeding as necessary until ground cover is fully established. Temporary works shall include suitable drainage measures and silt traps so as to minimize the quantity of material eroded during construction which then enters water bodies.

### (2.11). Works Site Restoration

On a continuous basis during the implementation of the works, the supervision team will impose on the Contractor the restoration of the project site immediately after utilization of the concerned areas:

- \* cover borrow sites with top soil
- \* cleaning up of all construction sites and road camps after completion of works

Promote regeneration of native vegetation through restoration of ground cover, use of degradable geotextile when appropriate, and the use of indigenous



**National Works Agency**  
**Bridge Monitoring Form**

Project Site:	Date:
Brief Description of Construction activities currently being undertaken at the site:	
Monitored by:	Verified by:

<b>Environmental Issues</b>		<b>SCORE</b>					<b>Comments (Guidelines to follow when completing monitoring form).</b>
		1	2	3	4	5	
<b>Borrow Pits and Quarries</b>	Acceptable site selection (previous or new)						<i>No attempt to open site in sensitive ecological area. Preference for use of previously opened and approved sites. Are permits in place?</i>
	Working plan (top soil /trees retained, ...)						<i>Do agreed plans exist for rational site(s) development taking into account need to conserve topsoil and trees wherever possible? The site should be managed so there is no impounding of water, eroding slopes or sediment transport off site.</i>
	Restoration plan (agreed/implemented)						<i>Is there agreement on restoration either to "as was" or alternative use with land owner or local government authority; at completion, degree to which satisfactorily accomplished...?</i>
	No pollution/siltation of adjacent watercourse						<i>Are local water bodies/courses safe from pollution, erosion or sediment transportation off site? Are silt traps/sediment barriers or traps working? Are repairs needed for these?</i>
	Erosion control measures						<i>Are all control measures in place, functioning correctly and effective?</i>
	No avoidable nuisance: dust, noise, traffic						<i>Is there proper consideration of local communities? Any justifiable complaints?</i>
<b>Habitat &amp; Landscape Protection</b>	Access through sensitive areas agreed						<i>If through sensitive area, are there avoidable indirect impacts on flora and fauna or habitats?</i>
	No alteration of river courses						<i>River banks and water courses should be left unaffected.</i>
	No undue clearance /drainage impact						<i>Vegetation should be safeguarded to extent possible</i>
	Trees, valued landscape features						<i>Is there respect for integrity of local</i>

Environmental Issues		SCORE					Comments (Guidelines to follow when completing monitoring form).
		1	2	3	4	5	
	retained						<i>environment?</i>
	No rubbish, un-restored spoil tips						<i>Is there proper clean-up and avoidance of littering the environmental with debris</i>
Fuel & Material Storage	Compliance with petroleum industry guidelines						<i>Have all necessary guidelines been followed and implemented?</i>
	Protected and bunded hard standing						<i>Are fuel facilities located with reference to any possible fire or ecological hazard? Do they sit in bunded overspill area for capture of accidental spills?</i>
	Fire precautions in place						<i>Are hazard sources marked? Is there fire equipment in place? Is it serviceable? Does site staff know how to use?</i>
	Runoff collection drain/oil interceptor						<i>Is there plan for confining and storing used oils? How are they captured and how will they be disposed of? Is this satisfactory?</i>
	Acceptable temporary materials storage						<i>Are there hazards or nuisance to the general public from storage sites? Are better alternatives apparent?</i>
	Secure fencing around and within site						<i>Are sites adequately demarcated and safe to public?</i>
Waste Collection & Disposal	No pollution risk to surface /groundwater						<i>No risk of runoff or leaching of chemicals on site into groundwater. No risk from pit storage of oils? Are there provisions for toilets on site?</i>
	Appropriate hazardous waste disposal						<i>Ask how oil or chemical waste is being disposed of? What is the plan? Is it legal?</i>
	Adequate refuse/scrap disposal/clean-up						<i>Is waste being separated and kept in tidy areas for subsequent disposal? Is the site going to be cleared of metal, plastic and other waste in acceptable and legal manner? How will the site be cleaned up? Is it clean?</i>
Occupational Health & Safety	Emergency and accident plan (Safety Officer)						<i>Ask who is designated Safety Officer on given/different site(s), establish at other visits if alternative person designated when offsite? Did he do a course? Does he know anything? Has he trained other staff? Ask what emergency number is to be used in case of accident. Have them prove it works. Is there an alternative plan...? Are measures proposed being implemented?</i>
	Safety protection equipment employed						<i>What protective equipment is being used: boots, helmets, mufflers, eye protection, Is this appropriately used? Are accidents being recorded?</i>
	First Aid kit available and complete						<i>Is First Aid Box available, adequate, and kept complete. Does staff all know where it is? Ensure not locked or easy possible access organized. Safety Officer should be responsible for accident log and</i>

Environmental Issues		SCORE					Comments (Guidelines to follow when completing monitoring form).
		1	2	3	4	5	
							<i>Box.</i>
	Sobriety of labor force						<i>Has there been any evidence of the use or possession of alcohol or drugs amongst the labor force?</i>
	Organization and tidiness of site(s)						<i>Tidy working is indicator of contractor seriousness in health and safety. Is site tidy and well organized, clear of dangers to safety, e.g. by tripping/falling, restricted access to potentially harmful tools/materials/chemicals.</i>
	Local nuisance mitigation (noise, dust, traffic)						<i>Are there avoidable impacts to local community?</i>
	Adequate street lighting and warning signs						<i>Is site safe for public?</i>
Rehabilitation Works	Maximum working corridor of 25m						<i>...to avoid unnecessary local disturbance</i>
	Adequate roadside drainage						<i>Are drains effective and kept clean, i.e. not blocked with sediment, trash, etc.?</i>
	Spoil tip slopes less than 1:4						<i>...erosion risks mitigated, especially in rainy season?</i>
	Road (safety) signs in place						<i>Are adequate temporary signs in place? Are permanent (post-construction) signs placed appropriately?</i>
Water Pollution	Installation of Temporary drainage system						<i>Is installed drainage system effective&gt;</i>
	Maintenance of drainage system						<i>Are drainage system maintained in a timely manner and after flood events</i>
	Stock piles protected during rain to prevent erosion						<i>Are stockpiles adequately protected from rainfall events?</i>
	Installation of sediment control measures						<i>Are silt traps installed and in place? I.e. are measures in critical area?</i>
	Maintenance of sediment control measures						<i>Are sediment control structures re-deployed, repaired or replaced on a timely basis?</i>
Air Pollution/Air Quality	Watering of unpaved areas to avoid dust generation						<i>Is potential and existing dust producing areas watered on a regular basis?</i>
	Vehicles transporting materials covered en route.						<i>Are vehicles fitted with tarpaulin or other covering material during transportation of material?</i>
	Phasing of vegetation removal to minimize exposure of soil.						<i>Does the scheduling of vegetation removal activities or site clearance activities phased to minimize the impact on the environment?</i>
Noise	Notifying community on work activity/schedule						<i>Does the local community receive adequate notice about work activities?</i>
	Breaks in noisy activity to reduce						<i>Are activities near residences phased to reduce the impact of noise nuisance?</i>

1= non Compliance; 2 = Poor Compliance; 3 = Fair Compliance; 4 = Good Compliance; 5 = Full Compliance

Environmental Issues		SCORE					Comments (Guidelines to follow when completing monitoring form).
		1	2	3	4	5	
	stress levels						
	Work done during normal working hours						<i>Are working hour structured to comply with standard daylight hours (7:00 a.m. – 6:00 p.m.)</i>
Community Relations	Short-term employment						<i>Do local community members benefit from employment on the site?</i>
	Traffic management system						<i>Is there a traffic management plan in place? Is there adequate signage at the work site?</i>
	Community Relations protocol						<i>Does the contractor/consultant hold regular consultation/meeting with the local community?</i>

**Additional Comments or clarification of issues noted on the site**