3 ENVIRONMENTAL MANAGEMENT PLAN

The project Term of Reference require preparation of the Road Design in all components including widening of the existing carriageway and reconstruction of the sidewalks, within the existing right-of-way. The consultant has also prepared the detailed cost estimate for all the sections. In the project it is included the realignment of the new underground utilities such as: water drainage and sewerage, electric, telephone cables and street lighting system, traffic lighting; as well as road marking, vegetation where the width of the road allows.

The monitoring program will be prepared in accordance with what is foreseen in the ToR according to the World Bank procedures and Albanian national legislation. The Albanian environmental laws, Policy, Legal and Administrative Framework, are identified in the EIA Report .

The World Bank's procedures are outlined in the following documents:

- Environment Department of the World Bank, Environmental Assessment Sourcebook Update – Environmental Management Plans, Number 25, January 1999
- The World Bank Operational Manual, Operational Polices, Environmental Management Plan, OP 4.01 – Annex C, January 1999

The environmental management plan (EMP) therefore, presents a set of mitigation, monitoring and institutional measures to be adopted during the construction and operational phases to eliminate or reduce adverse environmental and social impacts arising from the construction of the Tirana Middle Ring Road (MRR). It consists of the following components:

- Environmental Mitigation Measures
- Environmental Monitoring Plan
- Institutional Arrangements

3.1 Environmental Mitigation Measures

3.1.1 Alignment

The alignment of the new road follows the existing axis of the ring road. Widening of the carriageways will be carried out symmetrically in both sides of this axis. In all cases the new design respects the existing right-of-way as indicated in the City Master Plan. The Consultant prepared three options in order to minimize the demolition of structures.

As result, it is avoided the destruction of houses, apartments and residential structures along all ring road sections. In cases when the residential structures were positioned within the new sidewalk, the consultant has chosen the solution of underpasses between the columns of the structures, thus reducing only the spaces of the ground floor, that in all

cases are identified as commercial or services spaces. By luck, no structures used as residence are positioned within the new carriageway or parking areas.

3.1.2 Archeological Survey

A detailed archaeological survey of the final selected design is undertaken in parallel with the final design and should any archaeological relics be found, they shall be removed and preserved prior commencement of construction. In event that a significant find is located, such as relics of walls or any other type, the works will be immediately stopped and the contractor will notify the Project Manager and Employer, who on the other hand must pay the maximal attention in identifying and conservation of valuable objects.

3.1.3 Bidding Documents

The bidding documents include all the requirements listed in Sub-section 3.3 below. The following provisions are incorporated into the bidding and contract documents.

- **Embankment and & Slope protection.** Bidding documents and contracts are amended to ensure that all necessary actions are taken to ensure embankment stabilization, including the selection of less eroded materials, placement of gabions, riprap and good compaction, particularly around bridges and culverts. Contract documents specify that final forming and re-vegetation will be completed as soon as possible, following fill placement to facilitate regeneration of a stabilizing ground cover. Trenching is required where necessary, to ensure successful establishment of vegetation. Contracts specify that:

  - Slopes of road embankments will be seeded with a fast growing crop and potential native seed mix immediately after fill placement to prevent scour and to encourage stabilization.

  - Embankment slopes and road cuts will be stabilized by re-vegetation with grazing resistant plant species, placement of fiber mats, rip-rap, rock gabions, or other appropriate technologies.

  - Discharge zones from drainage structures will be furnished with riprap to reduce erosion when required, particular in instances in which drainage structures are installed and/or road formation levels are raised and create bare slopes that require stabilization before the onset of the monsoon.

  - Down drains/chutes will be lined with rip-rap/masonry or concrete to prevent erosion. Side slopes will be adjusted to in a range to be determined

as necessary and specified in the tender documents to reduce erosion potential or, if steeper, stabilized, covered with riprap or other material to prevent soil erosion.

- **Borrow Pit Restoration Requirements**. The contracts are reviewed to ensure enforceable provisions stating that:

  - Borrow areas will be located outside the ROWs.

  - Pit restoration will follow the completion of works in full compliance to all applicable standards and specifications.

  - The excavation and restoration of the borrow areas and their surroundings, in an environmentally sound manner to the satisfaction of the GRD or the construction Supervision Consultant (SC) acting on behalf of the GRD, will be required before final acceptance and payment under the terms of contracts.

  - Borrow pit areas will be graded to ensure drainage and visual uniformity or to create permanent tanks/dams.

  - Topsoil from the opening of borrow pits will be saved and reused to re-vegetate the pits to the satisfaction of the SC. Additional borrow pits will not be opened without the restoration of those areas no longer in use.

- **Sitting of Construction Camps and Related Facilities**. Project contract specifications stipulate that the sitting, construction and environmental restoration of facilities for the housing of construction personnel, the storage of equipment and vehicles, labor camps and similar facilities must be conducted to the satisfaction of, and are subject to the approval of the Supervision Consultant (SC). It is clear that the stipulations apply to all such facilities, including those that are privately negotiated.

- **Sitting of Asphalt Plants**. Contract provisions require that asphalt and hot-mix plants will be located at least 500 meters away from the nearest sensitive receptor (e.g., school or hospital) and subject to the approval of the SC, and that operators are required to install emission controls. Contract specifications shall stipulate that the sitting, construction and environmental restoration of these facilities must also be conducted to the satisfaction of and are subject to the approval of the SC. It is clear that the stipulations apply to all such facilities, including those that are privately negotiated.

- **Other Construction Equipment**. All construction equipment should be licensed and permitted in accordance with local requirements. Since Albania does not have requirements on air emission standards for construction equipment, such

equipment shall be certified to meet European Community standards or equal The Contractor shall present a copy of such certification to the SC.

- **Baseline and Routine Periodic Air Quality Monitoring**. Pre-construction monitoring of total suspended particulates (TSP) to establish the Contractor at locations shall undertake baseline conditions as determined advisable by the Supervision Consultant (SC). Construction contracts specify that instrumented monitoring will be required over a period of time of one month, prior to the initiation of construction to establish baselines against which impacts can be measured. Baseline monitoring locations should be determined on the basis of actual construction plans, including the specific locations of pollution sources (e.g., asphalt plants) and properly supervised by the MoTT/SC. Additional instrumented baseline monitoring for air pollutants other than TSP is not considered warranted in light of existing environmental conditions and/or the un-likeliness of significant Project impacts. Contingency provisions for additional baseline monitoring at the request of the MoT/SC, should be included, however, in the event that unforeseen circumstances are encountered.

  Specialized instrumented monitoring of total suspended particulate (TSP) at the same locations, as the earlier baseline monitoring points shall be stipulated for each Construction Package. Air quality monitoring should occur not less than once per month at each location and more frequently if determined necessary by the SC. Contingency provisions for additional air quality monitoring at the request of the MoT/SC if warranted by events should also be specified.

- **Other Air Quality Provisions**. In addition to the provisions for the sitting of asphalt plants, contract provisions shall also be reviewed to ensure that:

  - Open burning is prohibited.
  - Solvents and volatile materials shall be used to the satisfaction of the Supervision Consultant (SC).
  - Blasting (if any) is carried out using small charges.
  - Dust-generating items will be conveyed under cover.
  - Road surfaces, excavation and construction sites will be water sprayed to keep them moist for dust control as determined advisable by the SC.
  - Trucks carrying earth, sand or stone will be covered with tarps to avoid spilling.

- **Baseline and Routine Periodic Water Quality Monitoring**. Pre-construction monitoring to establish baseline conditions should be undertaken at locations as determined by the SC. Baseline monitoring of water quality is recommended on the Tirana River close to the road alignment and work camp. Measurements of suspended solids (SS), biological oxygen demand (BOD), dissolved oxygen (DO), conductivity and fecal colform, and oil and grease levels are required.

Instrumented monitoring of water quality and runoff from construction camps, staging areas and labor camps, not less than once every month is required. It is required to include measurements of suspended solids (SS), biological oxygen demand (BOD), dissolved oxygen (DO), conductivity and fecal coliform, and oil and grease. Contingency provisions for additional water quality at the request of the MoTT/SC, if warranted by events, should also be specified.

- **Other Provisions Related to Water Resources**. In addition to the erosion control, labor camp and related provisions, accommodations incorporated in the detailed design contract provisions shall be reviewed to ensure the adequacy of waste disposal provisions, including provisions for the disposal of waste oil, human waste.

- **Baseline and Routine Periodic Noise Monitoring**. Construction contracts specify the instrumented baseline noise monitoring over a stipulated period of time, prior to the initiation of construction, to establish baselines against which impacts can be measured. Additional instrumented baseline noise and vibration monitoring is not considered warranted in light of existing environment conditions (existing vibration levels in urban areas, for example, are essentially nil) and the unlikelihood of significant Project impacts. Contingency provisions for additional baseline noise monitoring, at the request of the SC, shall be included however, in the event that unforeseen circumstances are encountered.

  Routine instrumented monitoring of noise levels should be stipulated at not less than two locations in Road Rehabilitation Sites, at the same locations as the earlier baseline monitoring. Instrumented monitoring should be stipulated not less than once per month and more frequently if determined necessary by the SC. Contingency provisions for additional noise and vibration monitoring at the request of the SC if warranted by events should also be specified.

- **Other Noise-related Provisions**. Contracts should specify source controls, time of day restrictions, time and activity constraints and community awareness activities.

- **Wastes**. The contractor shall be required to dispose wastes in an environmentally sound way as specified in the Local Sanitary Regulations No. 376 date 17.11.1997 Item III- Disposal of Wastes (see Attachment 3). Wastes include sewage and solid wastes, waste lubricants, and construction wastes. The contractor shall prepare a plan for waste disposal to be submitted to the SC for his and MoT's approval.

- **Safety Provisions**. Contracts contain provisions for detours and traffic interruptions, blasting procedures (if any) and emergency response procedures in

the event of accidents or natural disasters.

- **Community Relations**. Contracts contain provisions requiring public information programs in advance of construction, notification procedures, etc.

- **Cultural Resources**. Contracts contain provisions to stop work and to notify the SC in the event of the finding of archaeological or cultural remains on the alignment, and to cease work in their vicinity until such time as a team from the Archaeological Institute of the Academy of Science of Albania can be sent to the field and it has had a reasonable opportunity to identify and remove any artifacts.

The following is the procedure to be followed in the event that archaeological or cultural relics are found:

- The Contractor shall stop work and notify the SC and the Director of the Project Implementation Unit (PIU) of the Ministry of Transport based at the General Roads Directorate and the Municipality of Tirana.

- The PIU will then notify the General Director of GRD and General Director of the Public Works in the Municipality of Tirana that these must notify immediately the Archaeological Institute of the Academy of Science of Albania to take necessary actions.

- The PIU will coordinate the mobilization of the team of experts to visit the site and to undertake the necessary steps for the identification and removal, if possible, of the finds and for the further monitoring of those areas that could be contain other relics to the find.

- The contractor shall have the right to be compensated for the cost he has to bear for the immobilization of his equipment throughout the duration of the suspension of works in the area. Additional time will be given to the Contractor equal to the actual time he has obliged to stop works.

- The cost of the team of archaeologists and excavation will be borne by the Municipality of Tirana.

- **Site cleanup**. On completion of works the contractor shall be required to remove and cleanup all his work sites, removing and disposing of materials, debris, and wastes in an environmentally sound way.

3.1.4 Road Safety

A Road Safety Audit program shall be undertaken by a specialized international Consultant in conjunction with the revision of the design and

tender documents. This shall specify design measures, vertical and horizontal signage, guardrails and all other measures necessary to ensure maximum traffic safety. These measures shall be included in the contract drawings and technical specifications as appropriate. Further safety audits should be undertaken during construction and operation to ensure that measures are implemented and successful.

The road safety program will include audits at the following stages:

- Prior to final design a road safety expert will visit the selected road alignment and, after discussions with MoT/PIU, prepare an audit report indicating road safety elements to be included in the road design and incorporated into the construction contract drawings and specifications.
- Prior to acceptance of the final design, the safety expert will review the design drawings and specifications to ensure that the safety requirements have been met.
- On completion of construction and prior to commissioning of the road the safety expert will inspect the road to ensure that the required safety features have been incorporated. He may also recommend additional administrative measures to be taken such as speed limits. He will submit an audit report indicating either acceptance of the road or listing items that need to be completed as well as his recommendations for administrative measures to be taken during operation of the road.
- Approximately two years after the road has been opened the safety expert will inspect the road and review safety experience with the responsible authorities. He will prepare an audit report detailing any further measures he recommends improving safety.

It is recommended that the safety audit procedure be combined with training in the procedure for MoT staff such that they would be capable of undertaking the audit procedure for other urban roads in Tirana in the future.

3.1.5 Construction

Construction shall be undertaken in accordance with requirements of the revised tender documents including the specifications for minimizing environmental impacts. The requirements of the resettlement plan shall be fully implemented to ensure that impacts on the project on the affected population are minimized. All administrative measures will be established prior to the destruction of any structure or the taking of urban land. Where commercial activities have to be resettled prior to the taking and destruction of existing structures.

It is estimated that the contractor will employ approximately 200-250 local

labor forces. The local workers will be hired locally and live at home or provide for their own housing.
Implementation of the specifications shall be monitored by both the SC and MoT and PIU. Should a design-build contract be awarded it is recommended that an outside consultant be hired to review the Contractor's performance.

MoT must fund the presence of a full-time environmental specialist during construction.

Prior to completion and opening of the new design of the road to traffic a second Traffic Safety Audit shall be undertaken by an independent auditor to ensure that all the required safety measures have been installed.

3.2 Environmental Monitoring Plan

The Environmental Monitoring Program incorporated in the Project will include routine site inspections and reporting. Specific baseline and periodic monitoring recommendations related to the major environmental criteria are as follows. These are summarized in Table.

3.2.1 Soil and Erosion-Related Monitoring - During construction the MoT Environmental Expert shall inspect all ongoing works weekly to ensure that soil erosion controls are being properly implemented. Where requirements are not being implemented, he/she shall immediately notify the Contractor and the SC who shall be responsible to ensure that appropriate corrective measures are taken. During operation, the MoT Environmental Officer shall inspect the roadway four times a year to determine whether any area is particularly susceptible to soil erosion, or whether such erosion is occurring. In the case that he/she finds signs of erosion, actual or potential, he shall immediately notify the responsible MoT office and superiors, which shall be responsible for taking appropriate corrective action.

3.2.2 Water Quality Monitoring

Instrumented Baseline and Routine Periodic Water Quality Monitoring. Pre construction monitoring to establish baseline conditions should be undertaken at locations as determined advisable by the SC (See Section 3.2). Baseline monitoring of water quality will be carried out at the locations of major sources of potential water pollution (construction camps and other sources of significant runoff and liquid waste generation).

Measurements of suspended solids (SS), biological oxygen demand (BOD), dissolved oxygen (DO), conductivity and fecal coliform, and oil and grease levels are recommended. The frequency of water quality monitoring shall be established by the SC during the construction period and implemented by

MoTT and relevant public enterprises during the operation of the road.

3.2.3 Air Quality Monitoring

Instrumented Baseline and Routine Periodic Air Quality Monitoring. Pre-construction monitoring to establish baseline conditions will be required at locations as determined advisable by the SC within the road rehabilitation segments of sufficient length to warrant such monitoring. Additional instrumented baseline monitoring for air pollutants other than TSP is not considered warranted in light of existing ambient conditions and the unlikelihood significant Project impacts. Contingency provisions for additional monitoring at the request of the MoT/PIU/SC will be specified however, in the event that unforeseen circumstances are encountered.

3.2.4 Noise Monitoring

Baseline and Routine Periodic Noise Monitoring. Construction contracts will require instrumented monitoring over a period of time prior to the initiation of construction to establish baselines against which impacts can be measured. Baseline noise monitoring will be required only where the duration of potential impact and the proximity of sensitive receptors warrant such monitoring. This will be in the section one near the high school "Harry Fultz", in the section two near the market and in the section three in the Hospital territory. Routine instrumented monitoring of noise should be stipulated at same locations as the earlier baseline monitoring. Instrumented monitoring should be stipulated not less than once per year during operation of the road.

3.2.5 Reporting

MoT and PIU Must prepare an annual report detailing the results of the monitoring program.

3.2.6 Mitigation Program

Every environmental aspect is covered by the mitigation program (see the table), which includes the costs and entities/institutions responsible for taking the planned mitigation measures. As mentioned above, these measures are part of the construction contract.

3.2.7 Costs

The cost for execution of the monitoring program includes costs of

inspection, surveys, reporting. The total amount goes at about US$ .The costs during the construction phase have been calculated supposing a two-year construction period.

Table 3.1

Baseline	Construction	Operation	Total
US$ 3,500	US$ 25,000	US$ 2,500	**US$ 31,000**

3.3 Institutional Arrangements

Institutional Arrangements include the definition of responsibilities for the implementation and monitoring the mitigation measures as defined.
In order to be able to undertake adequate monitoring of the Middle Ring Road EMP, the Municipality of Tirana (MoT) has appointed a full time Environmental Officer who will be in charge of the Projects Monitoring Unit in the General Directorate of Public Works. This official is among most qualified local experts and will also be given additional training as warranted. MoT has already an Environmental Inspectorate that will help and support in execution of the measures. This inspectorate will be part of the multi-disciplinary team in monitoring the Mitigation Plan. The location of the Environmental Inspectorate and Environmental Unit is shown in the Municipality of Tirana organization chart. Presently the activities of the Environmental Inspectorate are limited in the city solid waste disposal, marketing and sanitary regulations, etc. In the interim, both Environmental Unit within General Directorate of Public Works and Environmental Inspectorate need the assistance of experienced consultants (to be hired by GRD) to develop their guidelines for environmental impact assessment, mitigation measures and monitoring.

Table 3.2 Environmental Mitigation Plan

Phase	Issue	Mitigating Measure	Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
			Install	Operate	Install	Operate	
Design	Positive impacts:	Positive impacts		NA	MoT	NA	
	- improved capacity to move people and goods between locations	- using the optimal allowed road-dimensions		NA	MoT	NA	
	- improved walking-mobility of people	- air-quality in compliance with standards of Item 1.3		NA	MoT	NA	
	- benefit to local and city economy	- planting of new vegetation in 4000 m^2 and 800 new trees along the sidewalks		NA	MoT	NA	
	- reduced traffic congestion and disruption	-using of improved pedestrian traffic system by new sidewalks, traffic lights, signs for pedestrians, sidewalk lighting		NA	MoT	NA	
	- improved pedestrian safety	- using road lighting - wider sidewalks - using of the traffic signal system - road signing and marking		NA	MoT	NA	
	-improved sewerage	-using the new and bigger sewerage pipes 2x300 mm instead of 2x200 mm		NA	MoT	NA	
	- improved and safer water supply	-using the new and with bigger capacity of water supply pipes. New PE 300 mm main pipes instead of 200-250mm existing cast-iron old pipes.		NA	MoT	NA	
	- no land acquisition and expropriation			NA		NA	
	Negative impacts:						
	- as a reconstruction of the existed road doesn't have negative impacts			NA		NA	

Phase	Issue	Mitigating Measure	Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
			Install	Operate	Install	Operate	
Construction	Positive impacts: - increased number of direct jobs in the engineering and construction sectors - economic benefits from economic multiplier						
	Negative impacts:	***Negative impacts*:**					
	1. Material Supply a) Asphalt Plant -dust -worker health/safety	*1.Material Supply* a)Requirement for official approval or a valid operating license from National Environmental Agency of Albania (NEAA) specified in bid document	NA	NA	a) asphalt plant owner	a) asphalt plant owner	
	b) Sand/Gravel -disturbance to river bed / water quality/ ecosystem	b) see a) above	NA	NA	b) Sand/gravel contractor	b) Sand/gravel contractor	
	c) borrow pits	c) see a) plus borrow pit areas to be restored at the end of the contract	NA	NA	c) construction contractor	c) construction contractor	c) to be specified in bid documents
	2. Material Transport a) Asphalt -dust/fumes	2. *Material Transport* a) Asphalt - cover or wet truck load	NA	NA	a) Truck operator	a) Truck operator	a), b) and c) to be specified in bi d. documents
	b) Sand/Gravel -dust	b) Sand/Gravel - cover or wet truck load	NA	NA	b) Truck Operator	b) Truck Operator	
	c) Traffic Management -noise and vehicular exhaust, road congestion	c) Traffic Management - haul material at off-peak traffic hours; use routes to minimize major traffic sites	NA	minimal	c) Truck Operator	c) Truck Operator	
	3. Construction Site a) Noise	*3. Construction Site* a) Limit activities of traffic after (not between 11.00 p.m. to 7.00 a.m., or as agreed in consultation with the public	NA	NA	a)construction contractor	a)construction contractor	Points a) to i) to be specified in bid documents
	b) Dust	b) Water construction site and materials storage sites as specified in EMP 3.3	YES	YES	b) construction contractor	b) construction contractor	
	c) Traffic Disruption (during construction activity)	c) Measures to redirect traffic with signs that are easily seen and follow.	NA	NA	c) construction contractor	c) construction contractor	
	d) Vehicular/pedestrian safety	(d) Visible and well defined safety signs date 17.11.1997	YES	YES	d) construction contractor	d) construction contractor	
	e) water pollution from improper materials storage	e) cover material storage areas; construct channels to run off to sewage system	YES	YES	e) construction contractor	e) construction contractor	
	f) sediment run off	f) provide sediment fence, straw bales, etc	YES	YES	f) construction contractor	f) construction contractor	

Phase	Issue	Mitigating Measure	Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
			Install	Operate	Install	Operate	
	g) protection of water resources	g) take measures to prevent direct entry of water from construction sites into streams, canals, lakes, wells; provide detention basins, where needed.	YES	YES	g) Construction contractor	g) Construction contractor	
	h) archeological findings	h) notify archelogocial authority and follow their directions	NA	NA	h) Construction contractor	h) Construction contractor	
	i) construction camps	i) location of construction camps to be approved by local authority	YES	YES	i) Construction contractor	i) Construction contractor	
	4.Waste Disposal a)Construction debris (concrete, asphalt fuels, paints, contaminated soil)	*4.Waste Disposal* a)Dispose of in approved locality and cover with inert material as specified in SEI 2.2.1.	YES	NA	a) Construction contractor	a) NA	a) and b) to be specified in bid documents
	b) Solid waste	b) Dispose of properly in accordance with local sanitary regulations No. 376	YES	YES	b) Constructio n contractor	b) Construction contractor	
Operations & Maintenance	Positive impacts: - reduced fuel consumption from reduced congestion - longer vehicle life resulting from improved smoother road surface - reduced greenhouse gas emissions from improved vehicle performance associated with less congestion etc.	Positive impacts: -using the optimal driving speed up to 40 km/h - reducing the travel time and vehicle consumption - increasing of road safety					
	Negative impacts: *1. Maintenance of Constructed Road* - Noise, increased speed on roadways leading to higher noise levels	Negative impacts: *1. Maintenance of Constructed Road* - limit activities after 10.00 pm - limit driving speed up to 40 km/h	NA	Minimal	NA	MoT	

Table 3.3 ENVIRONMENTAL MONITORING PLAN

Phase	What *is to be monitored*	Where	How *is the parameter to be monitored/ type of monitoring equipment*	When *is the parameter to be monitored*	Why *is the parameter to be monitored*	Cost		Responsibility	
						Install	Operate	Install	Operate
Construction									
Material Supply (a) Asphalt Plant	(a) [NEAA] approval or valid operating license	(a) NA	(a) GRD Supervision Consultant	(a) At start of contract	(a) Assure plant compliance with environment, health and safety requirements of Albania	(a) NA	(a) NA	(a) Asphalt Plant Owner	(a) Asphalt Plant Owner
(b) Stone Quarry	(b) See (a)	(b) NA	(b) GRD Supervision Consultant	(b) At start of contract	(b), (c) and (d) Assure that contractor has relevant permissions for material extraction	(b) NA	(b) NA	(b) Quarry Owner	(b) Quarry Owner
(c) Sand/Gravel	(c) See (a)	(c) NA	(c) GRD Supervision Consultant	(c) At start of contract		(c) NA	(c) NA	(c) Sand/Gravel Contractor	(c) Sand/Gravel Contractor
(d) Borrow pits	(d) See (a) plus restoration at end of Contract	(d) Borrow pit sites	(d) GRD Supervision Consultant	(d) At any time borrow pits are proposed		(d) NA	(d) NA	(d) Construction Contractor	(d) Construction Contractor
Material Transport (a) Asphalt	(a) Truck load covered or wet	(a) Job site	(a) GRD Supervision Consultant	(a) After work starts- several unannounced inspections	(a) Assure Contractor complies with requirement	(a) NA	(a) Small	(a) NA	(a) MoT General Directorate of Public Works + Supervision Consultant

Phase	What *is to be monitored*	Where	How *is the parameter to be monitored/ type of monitoring equipment*	When *is the parameter to be monitored*	Why *is the parameter to be monitored*	Cost		Responsibility	
						Install	Operate	Install	Operate
Construction									
Material									
Transport (b) Stone	(b) Truck load covered or wet	(b) Job site	(b) GRD Supervision Consultant	(b) After work starts- several unannounced inspections	(b) Assure Contractor complies with requirement	(b) NA	(b) Small	(b) NA	(b) See (a)
(c) Sand/Gravel	(c) See (b)	(c) See (b)	(c) See (b)	(c) See (b)	(c) See (b)	(c) NA	(c) Small	(c) NA	(c) See (a)
(d) Traffic Management	(d) Hours and routes selected	(d) See (b)	(d) See (b)	(d) See (b)	(d) See (b)	(d) NA	(d) Small	(d) NA	(d) See (a)
Construction Site (a) Noise	(a) Noise levels	(a) At site or nearest homes	(a) Sound level detector	(a) Once/week- (AM-PM) and when locals complain	(a) Ensure noise levels at acceptable level	(a) NA	(a) NA	(a) NEAA	(a) MoE + MoT Supervision Consultant
(b) Dust	(b) Air quality (dust)	(b) At site	(b) Ringlemann or equivalent	(b) During material delivery and construction	(b) Ensure dust levels kept to a minimum	(b) NA	(b) NA	(b) NEAA	(b) See (a)
(c) Traffic Disruption (during construction)	(c) Traffic patterns + preparation of traffic management plan	(c) At or near site	(c) Approval of TMP and observation by GRD Supervision Consultant	(c) TMP as necessary + once/week at peak and non peak periods	(c) Ensure contractor's vehicles not causing congestion	(c) NA	(c) NA	(c) NA	(c) MoT General Directorate of Public Works + Supervision Consultant

Phase	What *is to be monitored*	Where	How *is the parameter to be monitored/ type of monitoring equipment*	When *is the parameter to be monitored*	Why *is the parameter to be monitored*	Cost		Responsibility	
						Install	Operate	Install	Operate
Construction									
Construction									
Site (d) Vehicular/ Pedestrian Safety (after hours when there is no construction activity)	(d) Visibility and appropriateness + traffic management plan	(d) At or near site	(d) Approval of TMP and observation by GRD Supervision Consultant	(d) TMP as necessary + once/week during evening	(d) Ensure contractor's works not causing traffic safety problems	(e) NA	(e) NA	(d) NA	(d) MoT General Directorate of Public Works + Supervision Consultant
(e) Water Pollution (from Improper Materials Storage/ Management)	(e) Water quality (primarily suspended solids)	(e) Runoff from site or materials storage areas	(e) Observation by GRD Supervision Consultant + water sample collected for analysis if necessary	(e) During precipitation (rain, snow etc.) and periodically during storage period	(e) Ensure contractor's works materials not causing water pollution	(e) NA	(e) NA	(e) MoE	(e) MoE+ MoT Supervision Consultant
(f) Sediment runoff	(f) Water quality (primarily suspended solids)	(f) Runoff from site	(f) Observation by GRD Supervision Consultant + water sample collected for analysis if necessary	(f) During occurrence of sediment runoff	(f) Ensure contractor's works not causing water pollution	(f) NA	(f) NA	(f) MoE	(f) MoE+ MoT Supervision Consultant

Phase	What *is to be monitored*	Where	How *is the parameter to be monitored/ type of monitoring equipment*	When *is the parameter to be monitored*	Why *is the parameter to be monitored*	Cost		Responsibility	
						Install	Operate	Install	Operate
Construction *Construction* *Site* (g) Protection of water resources	(g) Water quality of water resource	(g) At resource location	(g) GRD Supervision Consultant to collect water sample for analysis as necessary	(g) Water samples to be taken monthly and analyzed by competent laboratory	(g) Ensure water resources not polluted by the works	(g) NA	(g) Small	(g) MoE	(g) MoE+ MoT Supervision Consultant
(h) Archaeo-logical finds	(h) Archaeo-logical finds to be reported	(h) At site	(h) Observation by GRD Supervision Consultant and notification to Archaeology Department	(h) At time of discovery	(h) Archaeological finds to be reported by Contractor	(h) NA	(h) NA	(h) MoE	(h) MoE+ MoT Supervision Consultant
(i) Construction camps	(i) Location of construction camps to approved by Local Authority	(i) At site	(i) GRD Supervision Consultant	(i) At start of contract	(i) Ensure contractor's choice of location for camps is approved by Local Authority	(i) NA	(i) NA	(i) MoE	(i) MoE + MoT Supervision Consultant

Phase	What *is to be monitored*	Where	How *is the parameter to be monitored/ type of monitoring equipment*	When *is the parameter to be monitored*	Why *is the parameter to be monitored*	Cost		Responsibility	
						Install	Operate	Install	Operate
Construction									
Waste Disposal									
(a) Construct-ion debris (including contaminated soils)	(a) Surplus or unsuitable materials to disposed of in authorized tips	(a) At authorized/ licensed tips	(a) GRD Supervision Consultant	(a) At time of disposal	(a) Ensure correct disposal of waste and hazardous materials	(a) NA	(a) Small	(a) MoE	(a) MoE + MoT Supervision Consultant
(b) Solid waste	(b) Solid wastes to disposed of to authorized receivers	(b) At authorized/ licensed tips	(b) GRD Supervision Consultant	(b) At time of disposal	(b) Ensure correct disposal of waste materials	(b) NA	(b) Small	(b) MoE	(b) MoE + MoT Supervision Consultant

Phase	What *is to be monitored*	Where	How *is the parameter to be monitored/ type of monitoring equipment*	When *is the parameter to be monitored*	Why *is the parameter to be monitored*	Cost		Responsibility	
						Install	Operate	Install	Operate
Operation *Maintenance of Constructed Road* (a) Noise	(a) Noise levels	(a) At site or nearest homes	(a) Sound level detector	(a) During maintenance activities or when locals complain		(a) NA	(a) NA	(a) MoE	(a) MoE
Road Safety (a) Rock falls, land erosion, hazardous conditions	(a) Condition of hazard signs	(a) Along highway segment included in project	(a) Visual Observation	(a) One - two times/year		(a) NA	(a)NA	(a) NA	(a)MoT General Directorate of Public Works

3.4 Reporting

The results of the monitoring programme will be included in formal written reports and submitted to MoT, MoE and World Bank for review. The contractor and construction supervision companies will be requested to report their daily measurements and observations for environmental performance on a monthly basis. They will be further requested to report immediately any unexpected environmental pollution or impacts so that MoT and/or contractors can take appropriate actions to mitigate.

3.5 Estimated Monitoring Cost

The cost for the execution of the monitoring surveys includes both the tests and the reports. It is about $290,187. In the table the costs for each single phase are reported. It has to be pointed out that the costs during the construction phase have been calculated based on the assumption that it will take 5 years for the realisation of the project.

Table 3.4 Monitoring Costs

BASELINE	CONSTRUCTION	OPERATION
$600	$14,000	0,0
	TOTAL costs	**$2,000**

3.6 Institutional Arrangements

The contractor would have the task of preparing the detailed Monitoring Plan that would be developed in accordance with MoT and MoE. MoT will have the responsibility to coordinate and to control the monitoring activities. MoT will have to constitute a group of technicians that will control the elaboration of the Plan and the execution of the measures (Environmental Protection Office). This group will be supported by an environmental consultant, possibly an international consultant with a significant experience. MoE (see Figure 7.5.4.1) would propose to the Council of Ministers (CoM) the activities concerning the monitoring in order to involve the specialists of the Environmental Inspectorate (see Articles 60 and 61, Law No. 8934 of 9/5/2002). A multi-disciplinary team would be constituted that would demonstrate it has the equipment and qualified personnel to elaborate and carry out the monitoring. The Environment Management Organisation is showed in Figure below.

Fig 1. Environment Management Organisation

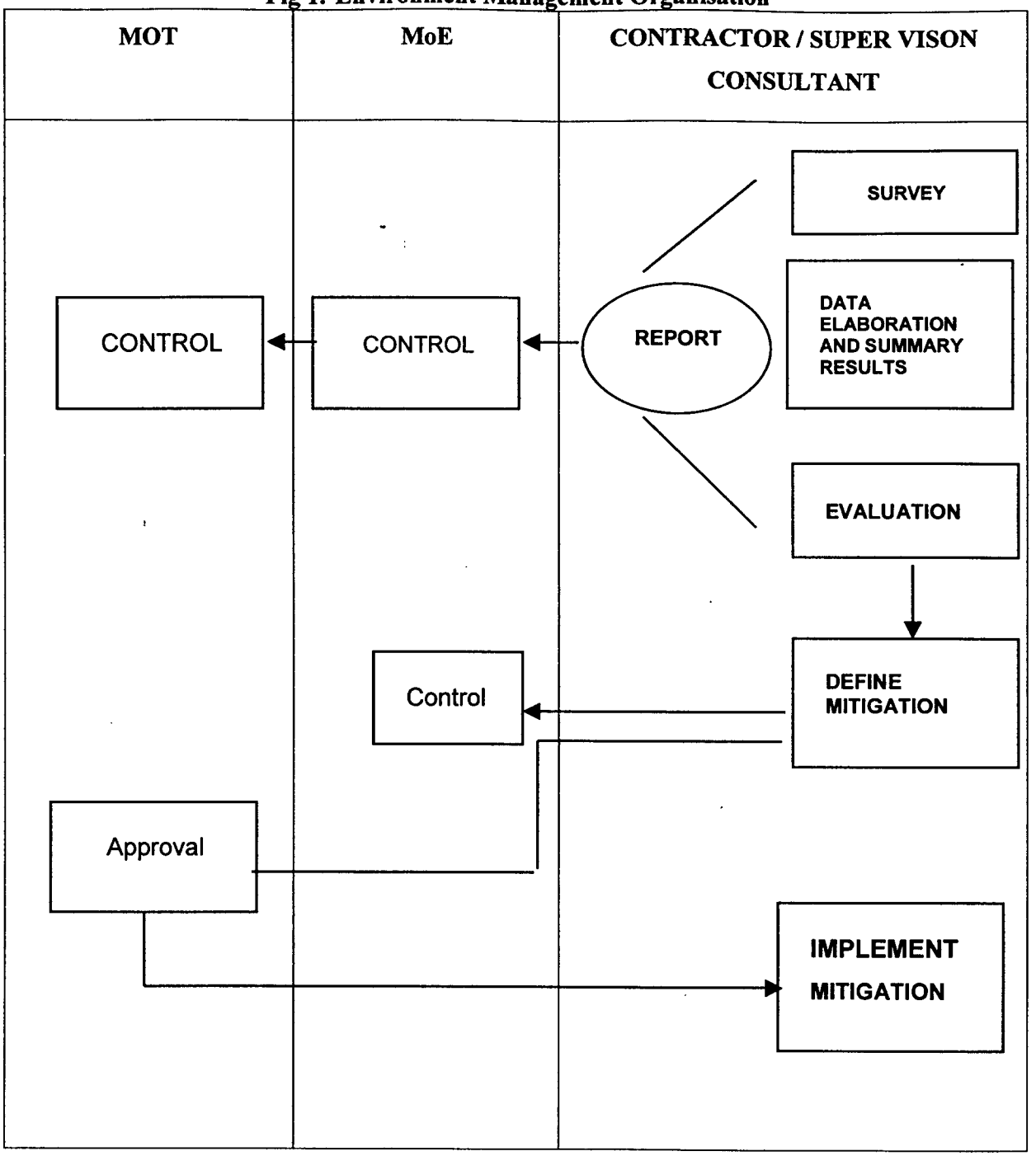

Fig. 2 Ministry of Environment
Organization Chart

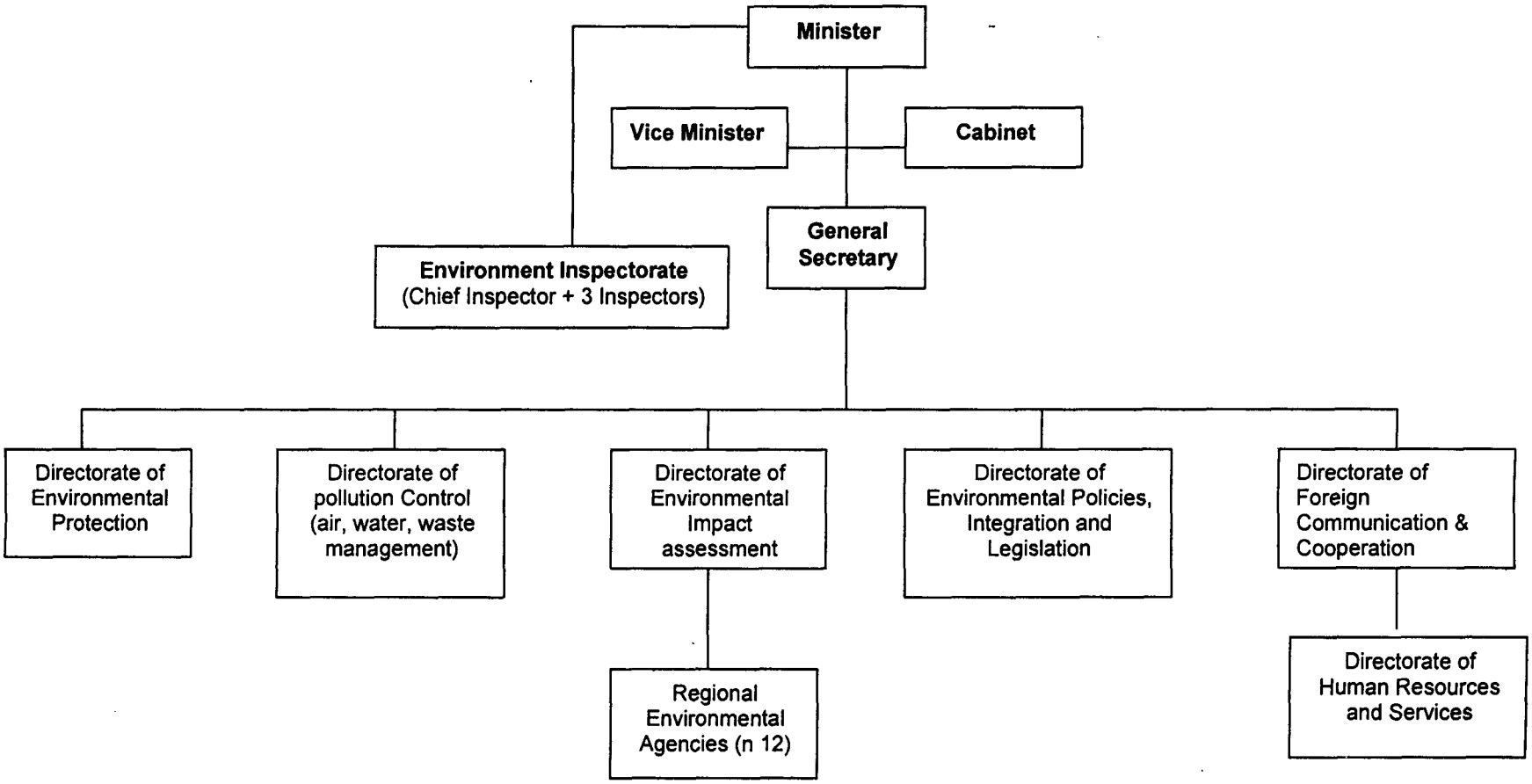

Figure 3

Management of Environmental Aspects
Organization chart