REPUBLIC OF MOLDOVA

MINISTRY OF TRANSPORT AND ROAD INDUSTRY

State Road Administration

SECTORAL ENVIRONMENTAL ASSESSMENT

MOLDOVA ROAD SECTOR PROGRAM SUPPORT PROJECT

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MOLDOVA
Chisinau

ABBREVIATIONS AND ACRONYMS

ATU	Autonomous Territorial Unit
CAS	Country Assistance Strategy
EA	Environmental Assessment
EAMF	Environmental Assessment and Management Framework
EECUN	European Economic Commission of United Nations
EGPRSP	Economic Growth and Poverty Reduction Strategy Program
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
GoM	Government of Moldova
IEE	Initial Environmental Examination
IDA	International Development Association
MENR	Ministry of Ecology and Natural Resources
MTRI	Ministry of Transport and Road Industry
NGO	Non-governmental organization
OP/ BP/ GP	Operational Policies, Bank Procedures and Good Practices
REC	Regional Environmental Center
SEA	Sectoral Environmental Assessment
SEE	State Ecological Expertise
SEIA	Statement on the Environmental Impact Assessment
SEI	Sate Ecological Inspectorate
SRA	State Road Administration
TA	Technical Assignment
UNDP	United Nation Development Programme
WB	World Bank

REPORT CONTENT

Executive summary

Moldova: Road Sector Program Support Project

Introduction

Moldova's road network totals about 10 537 km, of which 3,666 km are classified as National Roads and the remainder as Local Roads. Considering the size of the country and its population, the road network size is mostly adequate, with little or no need for expansion. About 58 percent of national roads are classified as poor, while for local roads the situation is worse, with 75 percent estimated to be in poor condition. The Government is presently preparing a Road Sector Program with the following main objectives: (i) to protect Moldova's core national road network from further deterioration; and (ii) to create an adequate institutional and financial framework for the sustainable development of road infrastructure and transport services. The Bank will support the Government's Program through an IDA-financed Road Network Recovery Project that would be the first World Bank-financed operation in Moldova's transport sector.

Terms of reference and methodology

The main scope of the environmental assessment process is to: (i) ensure that environmental issues have been taken into account in the design and implementation of the project; and (ii) ensure that country capacity is increased and that a regulatory framework and procedures are established and will serve as the basis for environmental impact assessments for all future road sector rehabilitation. For the proposed road investment program involving future projects (still to be defined), it is necessary to conduct: (i) a Sector Environmental Assessment (SEA) of the overall program prior to the commitment of resources and the finalization of subprojects; and (ii) a project-level Environmental Impact Assessment (EIA) to provide more detailed and subproject-specific analyses once the subprojects are identified. Therefore, the overall SEA goal is to try and determine the future potential environmental and social impacts of the program in the road sector, to specify the needs for EA institutional capacity building, and to define the mitigation and monitoring measures to be undertaken during project implementation.

The study was conducted based on the following: (i) analysis of the existing national legal documents, regulations and guidelines; (ii) SEA reports prepared for similar WB projects in other countries; (iii) WB safeguard policies, as well as guiding materials; (iv) results of consultations with the representatives from all interested stakeholders; and (v) field visits on the potential road subprojects that are under the consideration of the GoM for their inclusion in the project.

Project Environmental Category

Although project activities supporting rehabilitation and maintenance of the existing roads are not expected to generate significant adverse environmental and social effects, they would present moderate risks. In accordance with World Bank Safeguard Policies (OP/BP/GP 4.01 Environmental Assessment) the project is rated environmental category B (limited and reversible environmental impact). For such projects EIAs and an Environmental Management Plan (EMP) would nevertheless have to be carried out as part of project preparation and design. The EMPs would address the moderate adverse environmental effects of the physical rehabilitation activities of the project, would provide mitigation and monitoring plans to ensure appropriate attention to environmental and social issues, and would monitor management practices.

Environmental and Social Safeguards Review Process

Evaluation of environment and social safeguards issues has been an integral part of project preparation and of the selected road sub projects design. As the project will consist of several relatively similar road improvement subprojects (to be identified at a later stage of project design), it was decided to apply a phased approach to the EA. At the first stage it will be necessary to conduct the SEA. The SEA would consist of: (i) conducting an analysis of EA institutional capacities and preparing recommendations for improving the EA process in the road sector; (ii) preparing an environmental assessment and management framework (EAMF) that would establish safeguard procedures for selected road subprojects as well as guidelines with the details on potential environmental and social issues on how to prepare EMPs. This would serve as a template to undertake an appropriate environmental assessment of road subprojects once identified. At the second stage, the EA would include: (i) screening of proposed subprojects and identifying those that need a partial or full EIA study; and (ii) carrying out a specific EIA and preparing EMPs for selected roads.

National EA legal and institutional framework

Moldova has its own relatively well-developed legal and institutional framework for Environmental Assessments. This framework is in line with the existing WB EA rules and procedures as well as with the EU EIA Directives. The national EA legal basis is presented in two main laws: *Law on Environmental Protection* (1993) and *Law on Ecological Expertise and Environment Impact Assessment* (1996). These laws introduce the concept of state ecological review (literally, state ecological "expertise" – SEE) which seeks to examine the compliance of proposed activities and projects with the requirements of environmental legislation and standards. The SEE precedes decision-making about activities that may have an adverse impact on the environment. Financing of programs and projects is allowed only after a positive SEE conclusion has been issued. Procedures for conducting a SEE are contained in Guidelines on Performing SEE (2002). They define, in detail, the goal, objectives, and principles of the SEE, and stipulate the procedures for submitting project documentation, as well as reviewing procedures. For the road sector, the Ministry of Transport and Roads Industry (MTRI) has issued in 1997 specific *"Guidelines concerning environmental protection within the roads and bridges design, construction, rehabilitation and maintenance activities*". The Guidelines represent a comprehensive document that contains all environmental and social requirements necessary for designing, constructing and maintaining different types of roads and bridges in the country.

The responsible EE authority in Moldova is the Division on SEE within the State Ecological Inspectorate, a subdivision of the Ministry of Ecology and Natural Resources (MENR).

Institutional capacities to perform safeguards

The EA institutional capacity of the borrower was assessed during project preparation and concluded that MENR and SEE have relevant capacities to perform their duties concerning reviewing EA studies and enforcing EMP provisions. At the same time, within the MTRI and the State Road Administration (SRA) (the project implementing agency), there was not any special unit and/or especially designated staff responsible for environmental issues in the road sector, as well as any analytical laboratories that might assist in ensuring compliance with the existing legislation, regulations and ecological norms. In this regard it will be necessary to provide TA to the MTRI to strengthen its capacity and ensure the environmental requirements will be fully integrated into sectoral policies, and program design, as well as into design and implementation of the EIAs for subprojects.

Analysis of Environmental Impacts for the Road Sector

The nature and scale of impacts will be determined by the type of interventions undertaken by the project to assist the road sector, which focuses on rehabilitation and maintenance of the

existing roads. Generally no major project environmental impacts are expected. Most potential environmental and social impacts will be limited mainly to the effects associated with rehabilitation works, such as dust and noise control, use of bitumen, disposal of solid or hazardous waste, erosion control, and labor camp management (which will be temporary with only minor and localized negative effects). After completion, the project will have positive indirect impacts on human health and safety through decreased number of accidents and reduced air pollution from more constant travel speeds on rehabilitated road sections.

In order assist in identifying all the types of impacts that may arise from a project that will be selected, a checklist has been developed which highlights typical issues that need to be considered. The checklist serves to summarize potential impacts and provide a simple and visual tool for conducting an impact assessment, including assessment of magnitude and significance of the identified impacts.

Environment Management Plan

The SEA includes an EMP which covers different measures to mitigate any potential negative impacts, together with the respective monitoring plan, budgets, responsibility, and schedules of execution. The EMP consists of the following: (a) proposals for developing the regulatory framework for the EIA, strengthening the EIA capacity in all institutions involved; (b) an EA and EAMF that covers procedures for environmental screening of subprojects and criteria for categorization; it also covers procedures for conducting an EIA and/or preparing an EMP for selected subprojects; (c) environmental guidelines with the description of potential environmental and social impacts and suggested mitigation measures, based on the most advanced international practices; (d) a monitoring plan, including specifications for supervision as well as the basic environmental performance indicators, timeframe and responsibilities for proposed monitoring activities; and (e) implementing arrangements and a budget covering each step of the implementation of all proposed measures.

The first section of the EMP outlines the results of a short analysis of EA policy and the institutional framework, which is based on a series of recommendations for developing the regulatory mechanisms for EIA, and strengthening the EIA capacity in all institutions involved, i.e. in governmental road sector and environmental agencies and among national contractors

The EAMF outlines how the national EA rules, procedures and WB requirements will be applied to the civil works to be financed under the proposed project, and provides the tools to carry out the various steps required. It will be used as a guide and template by SRA to undertake environmental analysis and ensure compliance with the World Bank's environmental safeguard policies, and the relevant provisions under the Law on EE and EIS and associated regulations. Detailed EIAs/EMPs for individual civil works will be carried out (in accordance with the EAMF) by SRA consultants and when applicable, will be reviewed and cleared by the SEE under prevailing national environmental legislation in Moldova and satisfactory to the Bank.

The environmental management guidelines contained in the EMP describe the basic road maintenance and rehabilitation activities, identify possible environmental impacts for each activity, suggest mitigation measures, and designate responsibility for implementation. Implementation would be part of the road works contract while their enforcement would be the responsibility of the SRA, supervision consultant and of the State Ecological Inspectorate.

The Monitoring Plan includes measures that will be employed to track the effectiveness of the EMP, as well as environmental indicators to be monitored, monitoring methods and frequency, and reporting procedures. Furthermore, it also includes detailed recommendations concerning preparing and implementing subproject Monitoring Plans.

Main EMP provisions, especially with regard to EAMF, Environmental Guidelines and Monitoring Plans will be included in the Project Operational Manual and implemented by the SRA and contractors. Furthermore, it is proposed the main stipulations of these EMP sections be included in the Contract specifications that concern contractors' responsibilities for civil works, and the mitigation measures to be reflected in the engineering designs and bidding documents for each subproject. Among the most important provisions to be provided to the contractors (though there are others) are the following: (a) provisions on spill prevention and cleanup, dust and noise control, traffic management during construction, safety enhancement, construction site cleanup and rehabilitation; and, (b) provisions governing the sources of construction materials. Materials (e.g., asphalt, stone, sand, etc.) would be supplied only from sources with approved licenses, permits, and/or approvals for environment and worker safety; any equipment used during construction would meet internationally recognized standards for environment and worker health and safety. The Bank will review the initial contracts for roads rehabilitation works in each subproject to ensure that these clauses and measures are incorporated as proposed.

The EMP also provides details on implementing arrangements and capacity building activities. It is proposed a full-time environmental specialist be appointed in the SRA to assist with the SEA and EMP implementation, as well as to provide training on environmental management aspects of the project to MTRI and MENR and their rayon offices. The project would also provide the MTRI and SRA technical assistance for environment management and assessment, including training workshops in: (a) integrating environmental procedures, environmental policies and management into the project cycle; (b) reviewing projects that would require the preparation of limited or full environmental assessment; and (c) implementing EMPs for selected road subprojects. Additionally the project will support training activities for SEE on supervision of the EMPs implementation and the enforcement of provisions.

An amount of US $ as yet to be determined will be allocated for institutional strengthening of the MTRI and SRA, as well as to SEE staff. The actual cost of implementing the EMP for road subprojects was not estimated. Provided these are incorporated into the project design and reflected in the works contracts then these costs would be borne by the contractors. No additional funding will be provided to the State Ecological Inspectorate for monitoring compliance with agreed measures, enforcing laws, regulations and covenants; these costs would be borne by the institution.

Introduction

Moldova's roads and Government plans

Moldova's road network totals about 10 537 km, of which 3,666 km are classified as National Roads and the remainder as Local Roads. Considering the size of the country and its population, the road network size is mostly adequate, with little or no need for expansion. The network is not in good condition; about 58 percent of national roads are poor. For local roads the situation is even worse. It was estimated that 75 percent of them are in poor condition. Presently the Government is being prepared a comprehensive Transport Sector Program 2008-2017 that will include a Transport Sector Strategy and a prioritized 10-year Transport Investment and Expenditure Plan. The Strategy will address the underlying causes and issues of the road infrastructure crisis and propose legal, institutional and physical measures to overcome this situation. The Program will outline frameworks for all actions, investments and expenditures in the Transport Sector starting from 2008 onwards, including those to be financed by external donors. Investments in the road sector for the years 2006 and 2007 are based on the Government's interim program.

The Bank support

The World Bank and the Government have agreed that the Bank will support the Government's Transport Sector Program (in particular the Road Sector Program) through IDA funds, starting from 2007. This is reflected in the recent CAS update. The proposed IDA-financed Road Sector Program Support would be the first Bank-financed operation in Moldova's transport sector. The core objectives of the Government's Road Sector Program are: (i) to protect Moldova's core national road network from further deterioration; and (ii) to create an adequate institutional and financial framework for the sustainable development of road infrastructure and transport services. These objectives are closely linked with objectives stated in the EGPRSP, which is the guiding framework for cooperation between the Government, Bank and other donors.

SEA goals and objectives

The main goal of the Sectoral Environmental Assessment (SEA) was to determine and estimate the future potential environmental and social impacts of the activities to be undertaken under the project, and to define the mitigation measures, monitoring and the institutional measures to be undertaken during the implementation of the project. The objectives of the study are to:

- identify the country's rules and procedures as well as institutional capacity for conducting EIAs of road sector projects;
- identify the most important environmental and social issues related to the road sector in Moldova;
- develop EA and Management Framework that would cover the safeguard procedures for road subprojects yet to be identified, including screening criteria of proposed subprojects for identifying those that require a full EIA study the;
- prepare Environmental Guidelines for road projects that would an assessment of potential impacts and generic mitigation measures to be undertaken for identified sub-projects at all stages of road projects from identification and selection of roads and alignments, through the design and implementation phase, to the monitoring and evaluation of results;
- develop a sectoral environmental management plan that would include activities to: (i) strengthen institutional capacity for environmental impact assessment of road sector projects by developing the policy/regulatory and institutional framework for EIA; (ii) strengthen EIA capacity in all institutions involved, i.e. in governmental road sector and environmental agencies, and among national contractors; (iii) eliminate, minimize and/or mitigate the impacts resulting from sub-projects identified as not requiring full EIAs; (iv)

formulate recommendations for sector-wide regulatory changes and if possible, mitigating measures; and (v) provide general guidelines for monitoring activities;
- propose monitoring procedures, mechanisms, staff, training, equipment and resources to ensure that the environmental factors relevant for works undertaken under the roads program are implemented;
- Organize SEA disclosure for broad public and interested government and non-governmental organizations.

The present study was based on the following: (i) analysis of relevant national primary and secondary legislation in force, and other regulating documents such as strategies, policies, programs, etc.; (ii) analysis of the relevant publications, including guidelines, SEAs reports prepared for similar WB projects in other countries; (iii) WB safeguard policies as well as other guiding materials; (iv) results of consultations with the representatives from interested stakeholders/stakeholder groups; and (v) field visits on the potential road sub projects that are under the consideration of the GoM for their inclusion in the project.

Project Environmental Category

As the project focuses on road maintenance and rehabilitation, all works will be carrying out within existing right-of-way width. There will be no need for additional land requisitioning and disturbance to property. The project will not finance the construction of new roads or roads upgrading and thus it is expected that there will be minor or no impacts on soil and land (i.e. ones affected soil erosion processes and sedimentation/siltation of rivers, decrease slopes stability, etc.). It is also expected that rehabilitation/maintenance works will not have any effects on water resources and water quality along the roads. There will be no impact on natural vegetation associated with operating of quarry and borrow areas, as well as building of detours and access roads to the borrow pits and quarries since only existing borrow/quarry sites will be used. Furthermore, there are no important wildlife and wildlife habitat in the proposed project areas, and the project activities do not presume any intrusion into known and designated ecologically sensitive areas, parks and nature reserves. The potential impacts of the project activities on cultural, religious and historical sites will be assessed during the design stage. However, it is expected there exists no such sites to be direct affected by road rehabilitation and/or maintenance works.

Although project activities towards existing roads rehabilitation are not expected to generate significant adverse environmental effects, they would represent a moderate environmental risk. Based on aforesaid and in conformity with the World Bank Safeguard Policies (OP/BP/GP 4.01 Environmental Assessment) the project is rated environmental category B (limited and reversible environmental impact). An environmental impact assessment (EIA) and mitigation plan would nevertheless have to be developed as part of the project preparation studies. The environmental management plan (EMP) for selected road sub-projects would address the moderate adverse environmental effects resulting from physical rehabilitation activities of the project, and would provide mitigation and monitoring plans to ensure proper consideration of environmental concerns, and tracking progress or problems to ensure appropriate environmental management.

Environmental and Social Safeguards Review Process

Evaluation of environment and social safeguards issue was an integral part of project preparation. Since present project is a part of a broader Road Sector Program that would have a significant effect on the roads conditions in the country, as well as on improving of sectoral policies and institutional capacity, there was a need to perform both Sectoral Environmental Assessment (SEA) and Environmental Impact Assessments (EIAs) of the selected roads (sub-projects) where actual physical works would be carried out. The SEA included evaluation of

policy, legal and administrative frameworks; institutional strengthening plan in the field; recommendations for sector-wide regulatory changes, and mitigations measures. At this initial design stage, not all road sections to be covered by project were identified, so a site-specific EIA could not be conducted for all roads to be rehabilitated. Therefore, a framework for environmental assessment and management framework (EAMF) had to be prepared as part of the SEA, providing details of relevant environmental issues and guidelines on how to prepare Environmental Management Plans (EMPs). This has to serve as a template for performing proper environmental analysis for road sub-projects to be identified. The EAMF describes the screening process for identifying sub-projects having potentially significant issues that would need to be addressed in a sub-project EIA. The Environmental Guidelines include a general assessment of potential impacts and proposed generic mitigation measures to be undertaken for identified sub-projects. EIAs and/or EMPs shall be prepared for all individual road subprojects before works begin to ensure appropriate environmental management.

Based on aforesaid, it was decided to apply a phased approach to Environmental Assessment that include: (i) SEA including developing recommendations for EIA process and institutional capacity, development the framework for environmental assessment and management (EAMF), complying guidelines on how to prepare EMPs to be served as a template for environmental assessment for road sub-projects once roads are identified; (ii) screening of proposed sub-projects and identifying those that need partial or full EIA study; (iii) carrying out specific environmental analyses for identified roads with insignificant environmental impacts; and, (iv) carrying full EIA study for sub-projects considered as category A and B projects (according to WB OP 4.01).

1. Program description

The proposed operation would provide support to Moldova's Road Sector Program, which include three sub-programs of the Government's overall road infrastructure expenditures: (i) Moldova Road Sector Program Support Project, and two others (ii) routine road maintenance, and (iii) rehabilitation of badly deteriorated roads. It was agreed that Moldova Road Sector Program Support Project will not include reconstruction of roads which are already mostly destroyed because this would result in spending of most or even all available project's funds to recover only one or two road sections while many other roads/road sections requiring just rehabilitation to meet standard criteria would be further destroyed.

The main development objective of the proposed Moldova Road Sector Program Support Project will be reducing road transport costs for road users, by improving condition and quality of road network. This objective will be achieved by:

- *Road Rehabilitation Component:* rehabilitating 200 - 300 km of main roads and thereby reducing road user costs in a short term
- *Institutional Strengthening Component:* improving capacity of the State Road Administration to manage effectively the road network under its responsibility, and to implement road maintenance, rehabilitation and investment programs in an efficient and transparent manner. This will lead to reducing of road user costs in a longer term.

The project will be implemented over three-year period, from mid-2007 to mid-2010.

The main objective of the project will be preventing further deteriorating/destroying of Moldova's road network by carrying out physical works to restore adequate road conditions and thus recover the asset value of those roads. The project will also support the Government in implementing the institutional and sector reform measures to be identified by the Transport Strategy, in particular to create an adequate institutional and financial framework for sustainable development of road infrastructure and road transport.

The total project cost is estimated to be in the order of US$ 50 million, out of which 40% (US$ 20 million) would be provided via IDA credit, and 60% (US$ 30 million) via Government funds.

There were identified the following project components:

Component A: Periodic maintenance and rehabilitation of selected main roads. This component will include: (i) execution of civil works mostly for spot repairs, resurfacing, drainage repairs, localized repairs, periodic maintenance and light rehabilitation.; (ii) preparation of technical design studies, economic feasibility studies, and social and environmental impacts studies; (iii) preparation of bidding documents for civil works; (iv) works supervision and technical audit; and (v) related institutional support such as technical assistance for equipment procurement and other assistance needed for the State Road Administration (SRA). This project component will be executed by the Ministry of Transport and Road Industry (MTRI), with technical support from the State Road Administration.

It has been agreed that the road sections to be rehabilitated under the project will be (i) along the main North-South road corridor, between Criva in the north, Balti, Singerei, Orhei, Chisinau, Hincesti and Comrat in the South, and (ii) on the European corridor linking Chisinau with the border to Romania to the west. These two road corridors are the most important ones in terms of traffic levels and economic importance. Incorporation of the additional road corridor from Orhei to Rezina town, located at the North-Eastern border of Moldova was under discussion, but might be not included for feasibility study of about 500 km of roads, from which between 200 and 300 km will be selected for the Component A. Works will mostly consist of the application of a leveling course and a wearing course of asphalt concrete, after localized repairs have been carried out on the road. Other works to be carried out are re-establishment of adequate drainage and horizontal and vertical signage. Specific road safety features are to be included,

where appropriate and cost-effective, such as supply and installation of guardrails and traffic calming measures in villages along the road.

The physical works to be executed under the project shall focus on those roads whose basic structure is still essentially intact, and which can be saved from heavy deterioration by spending a relatively small amount of money per km of road. The type of works can be characterized as periodic maintenance and light rehabilitation; this includes full road resurfacing. This type of interventions will extend the useful lifespan of a significant portion of Moldova's road network by about 10 years.

Component B: Support to the implementation of sector reform measures outlined under the Transport Sector Strategy. This component will include: (i) technical and legal support services, (ii) training and capacity building for the staff of the administration (ministries and State Road Administration), road transport operators, and road design and construction firms, (iii) improvement of the road maintenance management system, and (iv) specific support to help mobilizing EU funding for the transport sector. This component will be executed by the Ministry of Transport and Road Industry.

2. Description of Environment (baseline data)

The current description of environment is covering three generic areas as biological and physical environment, socio-economic environment and cultural/historic environment. The information presented is mainly aggregated national data, but were selected as important for consideration in the road sector development. The specific features to be examined in more details during project implementation are specified. The Annex 1 includes selected maps, indicating positions of road corridors.

2.1. Biophysical environment

- **Country location, geology, topography and relief**

Moldova is a small landlocked country of 33,800 km^2. It spreads on 350 km from North to South and on 120 km from West to East, on the latitude of the capital city Chisinau which is the largest city. Moldova is bordered by Romania on the west and by Ukraine on the north, east and south. Most of its territory is drained by two large rivers, the Dniester and the Prut, both part of the Black Sea basin.

Moldova's geology is dominated by the Moldovan plate of the Eastern-European geological platform, but the southern region lies on the Skiff platform. Sedimentary materials of sandstone, clay and limestone cover the crystalline basement. These are the main mineral resources of the country and provide the basis of the construction industry. In territory of Moldova it is revealed a number of deposits of the minerals dated to described above geological formations. The majority of them are nonmetallic. As building materials are widely used Neogene limestones (wall stone and crushed, cement raw material).

Moldova is located within the seismic Carpathian region and is subject to earthquakes, the intensity of which can reach a rating of 6-8 on the Richter scale.

Location of deposits, available for local building materials (sand, gravel) may influence selection of optimal sites supporting the road rehabilitation and routine maintaining, but seismic situation should be considered for application of safety measures required for stability of roads, bridges and potential landslides, triggered by the earthquakes**.** This leads to stricter requirements to be applied to engineering works regarding safety and stability of infrastructure and consequently - to higher construction costs.

The country's topography is diverse, ranging from a steppe area in the North and South, to forested and mountainous highlands up to 430 meters in elevation in the center of the country. The landscape is dominated by rolling hills, and void of mountains and plateaus. The country forms a varied mosaic of undulating open and wooded steppe alternating with plains. The country has two geographical zones, subdivided by 5 main geographic regions, and comprised of 12 geomorphologic elements (or major landscapes). The Forest-Stepe zone at the central and north part of the country includes: (i) Region of forest-steppe heights and plateau, with broad flat valleys, has an elevation of between 250 to 300 meters, (ii) Region of Beltsi meadow-steppe plains and heights with elevations up to 200 metres, and (iii) Region of Codri forest height. The Kodri Hills, rising to a maximum elevation of about 429 m at Mount Balanesti, occupy the central portion of the country, while the semi-arid steppe of the Podolian Plateau is in the south. The Steppe Zone includes: (i) Region of lower Dniester steppe and terraced plains and (ii) Region of Bugeac steppe dismembered plains.

The mean altitude of the country is 147 m above sea level and the highest elevation is 430 m in central Moldova. The narrow valleys and steep slopes create the impression of a mountainous landscape. Additionally, the Moldovan plateau stretches across the north of the country with its thick outcrops of limestone, the so-called toltry, or sedimentary rocks, which remain from the

ancient times when the entire territory was submerged underneath the ocean. In the south, the extensive Budjac steppe gradually became the coastal lowlands on the Black Sea. The center of the republic is most hilly. To the south of Chisinau the hillsides are steep; the north of the country is less hilly.

Topographic relief has an important influence on the microclimate, landscapes and soil conditions and to a great extent determines specific road safety measures. At the same time beauty relief may attract voyagers to use road network.

- **Climate**

Moldova has a moderate continental climate, has transitive character between a soft climate of the Western Europe and a continental climate of east areas and characterized by short mild winters and long hot summers. The coldest month is January with average temperature ranging from minus 3ºC to minus 5ºC. Spring weather is unstable and can be characterized by rapid temperature rises. Summer is long, hot and dry. The warmest month is July, with average temperature ranging from 19ºC to 22ºC and the maximum daily temperature frequently exceeding 30^{o}C. The average annual air temperature is 7.5-10.0ºC and average soil surface temperatures are within the 10-12ºC range. The warm period lasts 146 to 180 days per year. Sunny days account for 45-50% of the year.

Annual precipitation varies from 550 mm in the north of the country to 350 mm in the south and falls mainly in the summer months as torrential rains, often accompanied by squalls and hail. Monthly precipitation is subject of considerable to big fluctuations in comparison with annual one. The maximum monthly precipitation varies in limits from 176 mm (town Comrat) up to 260 mm (town Cornesti). Summer precipitation is quite variable, ranging from monthly averages of 55-85 mm to 200-300 mm. About 18% of total precipitation falls as a mixture of rain and snow during winter months. South of the country is more arid as compared to center and north.

- **Surface waters**

The surface water resources of Moldova are mainly (90%) formed by the transit flow of the Dniester (with a total length of 1,352 km and 657 km within the country), and Prut (with a total length of 976 km and 695 km within the country) rivers. The water quality of the Dniester and Prut rivers is generally considered as suitable for irrigation, recreation and drinking purposes and used respectively.

Most of the internal rivers (providing about 10% of surface water resources) are small and only nine have a length exceeding 100 km. The internal rivers network consists of nearly 3,300 water courses with a total length of 16,000 km. Most of the internal rivers are canalized, with regulating dams and flood protection dykes, and most are moderately or heavily polluted. The main source of pollution of surface waters is improperly treated sewage, garbage sites and land erosion.

There are a few natural lakes remaining in Moldova. About 3,500 reservoirs have been established on the rivers, designated to trap sediments, provide water for irrigation, domestic and industrial needs, and support fishery. Most of the water bodies are reservoirs constructed on the small rivers which are regulated by weirs, built in cascade. They are an important local resource for livestock watering, fishing, commercial fish farming, maintaining domestic waterfowl and recreation.

The floodplains of many small internal rivers are highly exposed to flooding, due to climate and landscapes characteristics, poor technical status of weirs and inadequate dam safety management. Several cases of severe floods on small rivers have been reported over the last decade.

The network of small internal river-courses and relevant floodplains are important consideration for the road sector as it is required protection of surface water and safety measures to prevent floods as well as to protect road infrastructure.

- **Groundwater**

About 90% of Moldova's groundwater resources relate to the deep aquifers. Deep groundwater, especially from the Lower Baden Sarmat aquifer, underlying the entire country, is an important source of water for domestic and industrial purposes. In some areas deep groundwater resources are characterized by high levels of salt and fluoride content.

Shallow groundwater is present throughout the country's territory in recent Quaternary deposits that are composed mostly of sand, sandstone, and occasionally, gravel. These shallow aquifers are fed by precipitation and therefore are subject of pollution from the earth surface. At the same time, this is a major source of drinking water for rural population: about 50% of the country population relies on simple shallow dug wells. The shallow groundwater is highly vulnerable to anthropogenic impacts and sources of water contamination are mainly linked with rural areas. The range of natural and man-induced contaminants includes nitrates, fluorides and microbiological indices. The quality of groundwater abstracted by population for drinking purposes is particularly poor in central and southern parts of the country, where most of groundwater samples do not comply with quality standards for chemical parameters. Microbiological pollution is also common.

For road sector the groundwater level and its flow are important factors to be considered, as it may significantly affect road stability and provoke contamination of drinking water wells.

- **Soils**

Moldova posses excellent soils for agricultural production, and very little of land is left uncultivated. The black soils (chernozems) comprising 75% of all agricultural land are the main natural resource of Moldova. Continental climate and worm summer, vegetation type and soil fauna have caused a substantial accumulation of carbon in the soil. Non-eroded chernozem contains approximately 300 tons/ ha of carbon within upper 1 meter. Main types of country's soil are presented in the table below.

Soils	Surface, thousands ha	Share, %
Grey forest	120	3,6
Forest soil, destroyed by ravines, landslides and erosion	58	1,7
Cernozem and its main subtypes	1865	56,3
Cernozem, destroyed by ravines, landslides and erosion	272	9,9
Alluvial soil	263	11,6
Other types of soil	470	16,9
Total	**3 048**	**100**

Rich soils and favorable climate support substantial and diverse agricultural production ranging from wheat, corn, barley, tobacco, sugar beets, soybeans, and sunflower to fruits and grape. Beef and dairy cattle, as well as pigs, sheep and poultry are raised mostly on a household scale.

Moldova's economy is highly dependent on agricultural production and 57,7 per cent of its land area is used for agriculture. In Soviet times the intensive exploitation of agricultural land and use of ecologically harmful technologies have resulted in significant reduction of its productivity and a destructive impact on soil. Condition of the soil is crucial for agriculture and is a basis for development of a productive export-oriented agriculture and food-processing industry.

One of the most severe environmental problems in the country is progressive loss of topsoil: approximately 2 million hectares of land are affected by erosion; estimate annual soil loss is 26 million tons. Such a quantity of lost topsoil contains 700,000 tons of humus, 50,000 tons of nitrogen, 34,000 tons of phosphorus. Indirect damages from soil erosion refer to sedimentation of water bodies, contamination of soil and groundwater by agro-chemicals washed out from the hillsides, impairment of roads and hydro-engineering installations, etc. Along with heavy rains being the main factor contributing to intensification of erosion processes, others include: big share of arable land, deforestation, plugging along the slope, improper planning of road network; insufficient use of vegetation planting, exaggerated share of several crops (e.g. corn, sunflower) in crop rotations, tillage with use of heavy machinery.

The soil erosion pattern should be considered also for road network development to prevent and minimize soil contamination and erosion both by ravines and lost of the rich top-soil.

- **Landslides**

Due to the slope landscapes, clay soil profile and groundwater level the landslides are quite common feature of Moldova's nature. The landscape most commonly occurs during the winter and spring months due to increased precipitation rates, snow melt and soil saturation. If a certain limit of soil wetness "slope" internal matrix forces of the subsoil is surpassed, gravity forces will prevail and landslides may occur. Their occurrence is to some extent triggered by earthquakes, and by soil disturbances that lead to compaction, subsidence and rising groundwater tables. The latter takes place at building and road construction sites, under intensive agriculture, deforestation, and where dams are leaking.

Landslides can occur as shallow slumps (1-2 meters) on which reforestation helps, and on deeper slumps (up to 25 meters) on which reforestation may add to the problem. Landslides in Moldova do not take the form of mudflows, and move at speeds not exceeding 2-3 m/hour. Their size can be anything between 50 m^2 and 10 km^2. The danger concerns local displacement which may do damage to buildings and other assets. Some estimates show that high landslide incidence has a return period of 3-4 years. Most severely affected is the area between Nisporeni and Balti, around Riscani, and the area North of Orhei (>1 landslide per 2 km^2). The area around Chisinau has 1 landslide per 2-3 km^2. The highest degree landslide areas (3-5, 5-10 and 10-15% of surface covered by landslides) verge on Orhei, Balti, Ungheni and Calaras. Average estimate landslides process is 15,000 landslides on 30,000 ha, at an annual growth rate of 1000 ha.

Landslides pattern is very specific Moldova's feature required attention on designing and construction phase to mitigate possible triggering of landslides and protect the roads.

- **Air Quality**

Air pollution originates from a large number of local and external sources and has many negative effects on the public health and the environment, e.g. acidification, eutrophication, climate change, pollution, etc. The quality of the atmospheric air is determined by three major sources of pollution: stationary sources (mainly the power and heat generation sector and the industry); mobile sources (transport and agriculture machinery); and transboundary pollution.

The air quality concern in Moldova is big industrial towns, where most poor air quality is usually registered. Average annual concentrations exceeded the national standards (maximum allowable concentrations, MAC) is reported for: particulates (in Balti), nitrogen dioxide (in Chisinau) and formaldehyde (in Balti, Chisinau and Tiraspol). The index of air pollution integrating all six analyzed parameters is highest in the biggest agglomerations (Chisinau, Balti and Tiraspol), with an absolute maximum in Balti. The general trend of air pollution level in the main cities during the last five years is downward. The concentrations of sulfate and hydrocarbonate reached a maximum in industrial areas (Ribnita, Camenca, Tiraspol). Chloride practically did not show significant variation, which is an indicator of lack of specific pollution

sources in monitored areas. The highest concentrations of calcium and magnesium at the Ribnița site is a clear indicator of pollution from the cement and building materials industries located nearby.

Currently Moldova has 2,289 registered stationary sources, mainly in the energy and heat generation sector but also in industry and services (including 529 petrol stations). According to the official statistics, the total amount of pollutants from stationary sources in 2004 was 17,369 tons, including: particulates – 3,345 tons; sulfur dioxide - 2,005 tons; nitrogen oxides – 3,184 tons; carbon monoxide – 5,389 tons; others – 3,446 tons. These data do not include emissions from Transnistria.

Road transport is the main air pollution source, accounting in 2004 for approximately 200,000 tons of emissions or some 90% of the total emissions (Transnistria not included). This share is even larger in the big cities.

Following table[1] represents dynamic of air pollution from the mobile sources in Moldova.

Year	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Total emissions, thousand tons	238.2	100.5	215.6	174.4	110.0	118.8	122.9	130.9	180.0	200.0
of which:										
Volatile Organic Compounds	41.6	16.5	39.2	29.6	19.2	20.7	22.2	12.9	13.7	14.1
Nitrogen dioxide NO_2	19.8	7.0	25.6	13.4	9.1	9.9	10.7	15.1	16.2	17.4
Carbon monoxide CO	160.8	72.7	144.4	121.7	74.4	80.7	85.8	87.2	89.7	91.4

The road transport emissions depend on a number of factors such as the technical condition of cars, state of the roads and/or quality of gasoline. The enforcement of new requirements for gasoline (e.g. unleaded petrol and desulfurized diesel) contributed to the reduction of polluting emissions. During the last years (1999-2005) the share of unleaded petrol in the total volume of petrol imported has increased from 70% to 100%. At the end of 2005 some 430,000 motor vehicles were registered in the country and the trend is still upward. The technical condition of the cars has a significant influence on emissions. In Moldova, half of the fleet presently consists of cars being in use for 10 years and more, while the number of new cars is relatively small. The State Ecological Inspectorate, together with the road police, under the program of checking the cars in traffic (about 15,000 cars in the year 2005) for exhaust gas emissions indicates that in about 10% of cases emissions above the allowed limits are recorded (8% of gasoline cars and 15% of diesel cars did not comply with the emission standards and regulations).

- **Biologic and Forest Resources**

Natural landscapes and biodiversity in Moldova are limited and due to severe human impact (primarily land cultivation) they have been seriously degraded. Natural ecosystems cover no more than 20% of the country; they are very fragmented and are under degradation status[2]. In order to protect wide variety of remaining biodiversity Moldova has undertaken a number of nature protection measures including establishing of natural reserves, development of relevant policy, legislation and regulatory mechanisms, and others actions towards protection of threatened species, habitats and landscapes.

However, a number of factors prevent efficient management of the natural resources. These include: (i) insufficient public awareness about state of environment; (ii) illegal human activities; (iii) lack of training and informational support for local administration, mangers of agro-industrial enterprises and economic entities; and, (iv) low capacities of environmental, water and forest authorities to sustainable manage the natural resources/ecosystems.

[1] Statistical Yearbook 2005. Chisinau, 2005

[2] Biological Diversity Conservation. National Strategy and Action Plan, 2002.

Moldova borders the Mediterranean biogeographic zone in the south. The remainder of the country occupies an intermediate zone between the continental Eurasian steppe to the east and the European forest-steppe to the west. Additionally, there are small plots of meadows (in river valleys), halophites (on salinized lands), hydrophytes (in wetland areas) and xerophites (on rocks and dry clay slopes) which comprise the rest of the country's ecosystems diversity. Geographic position, climate and landscape of Moldova provided conditions for the development of a rich **biodiversity**. Moldova's biodiversity[3] is represented by more than 6,720 flora species, including 3,400 algae and 1,200 fungi, and more than 16,540 fauna species, including 461 species of vertebrate, 16,080 species of invertebrate, and 633 species of protozoa.

The natural **flora** belongs to two zonal types, namely steppe and forest steppe vegetation. According to geo-botanical classification the territory of Moldova is divided into three areas: the European broadleaf-forest area, the Mediterranean forest area and the Euroasian steppe area.

The steppe zone covers plains and highlands situated to the south and east from the central Codru Plateau and the Tigheci Hillocks. Besides, steppe vegetation occurs in northern part of the country (the Balți steppe). Almost all former steppe areas now are used for agriculture so that only small plots of natural steppe communities can be found on steep hillsides or areas affected by landslides.

The forest steppe zone includes forest communities, mostly located on hills, alternating with steppe vegetation areas. The dominant forest species are English oak and durmast oak, sometimes in association with beech. In the south, pubescent oak groves are present on hillsides. Riverine forests made of willow and poplar is common in the river floodplains.

The occurrence and abundance of **fauna** is dependant to a great extent on vegetal communities, which provide them food and shelter. The most common mammals inhabited in Moldovan forests are: fallow deer, wild boar, fox, badger, squirrel, marten, and wild cat. The bird species include oriole, magpie, hoopoe, nightingale, blackbird, etc. The steppe animal communities comprise several species of rodents and birds (skylark, quail, and partridge). The lakes, wetlands and marshes provide shelter and food to many birds, including migratory ones. A number of rare and/ or endangered animal species are protected by law (116 species are included in the Red Book of the Republic of Moldova, 2001).

According to the Land Cadastre, the forests covered 362,700 ha at the beginning of 2004 (10.7% of country's territory). The current forestation level is considered as insufficient for an effective environmental balance. The area of forests per inhabitant in Moldova is 0.086 ha per inhabitant as compared to 0.3 ha/inh. in Romania; 0.4 ha/inh. in Bulgaria, not to speak about countries like Sweden (2.5 ha/inh.) or Finland (3.7 ha/inh.). Moldovan forests consist basically of communities of broad-leaved species (98%) dominated by oak (143,800 ha) and acacia (131,000 ha).

A large number of forest protection strips have been established in the past sixty years to combat soil erosion provoked by wind. They have been planted on agricultural lands, along river banks, along the roads and around cities and industrial areas. However, these protection strips have recently been subjected to substantial illegal harvesting primarily for firewood and other wood products due to rural poverty. By 1994 areas covered by protection strips decreased by 75%. Continuous degradation of the forest cover, including protection strips, has contributed significantly to increase of aridity, soil erosion and loss of topsoil.

[3] Biological Diversity Conservation. National Strategy and Action Plan, 2002.

Understanding of biodiversity importance for the country's ecological stability is one of the key factors to be considered in the road sector. The special attention should be paid to conservation of such natural habitats as forests, meadows and steppe during road construction, maintenance and traffic. In particular, it relates to migratory ways which have to be considered while developing the road sector.

- **Endogenous species and Natural State Protected Areas**

The state is obliged to determine rare and threatened species inhabited in the country, and to develop and implement a variety of protection measures. Generally, the share of protected species in relation to total number of species is very high in Moldova. Of a total number of 1832 vascular plants found in Moldova, 96 species (or about 5%) are protected by state in one or another form. As for fauna, 11 species from total number of inhabited 70 species of mammals, 7 species of reptiles (from total number of 14) and 13 species of fish (from total inhabited number of 82) are under state protection.

The state has developed a system for protection of important and threatened habitats and landscapes. Between 1962 and 1998 the surface of protected areas has increased from 3,700 ha to 66,500 ha. The Natural State Protected Areas Fund comprises 310 sites with total surface 66,487 ha, or 1.96% of country's territory. Most protected areas in Moldova are scientific and landscape reserves (52% and 29%, respectively). Others are: natural reserves of medical plants (7.4%), natural forest reserves (4.2%) and geologic and paleontology nature monuments (4.0%). The share of protected areas represented by steppe and meadow vegetation, and landscape architecture monuments is very small.

The categories and surface areas protected by state[4] are indicated in the table below.

Categories of natural objects and complexes	Number	Area (ha)
Scientific reserves	5	19,378
Nature monuments, including:	130	2,907
Geological and paleontological	86	2,682
Hydrological	31	100
Botanical	13	125
Natural reserves, including:	63	8,009
Forests	51	5,001
Medical plants	9	2,796
Complexes	3	212
Landscape reserves	41	34,200
Resource reserves	13	523
Multi-purpose management areas, including:	34	1,030
Typical areas of steppe vegetation	5	148
Typical areas of meadow vegetation	25	675
Protective forest belts	2	208
Botanical gardens	1	105
Dendrological gardens	2	104
Garden architecture monuments	20	191
Zoological gardens	1	20
TOTAL	**310**	**66,487**

In spite of range of measures taken towards conservation and expanding of natural areas protected by state, their present state is generally poor, except natural reserves that are maintained more or less adequately.

[4] Biological Diversity Conservation. National Strategy and Action Plan, 2002.

2.2. Socio-Economic environment

- **Macro-economic and poverty features**

After a period of steady economic growth throughout the 1970s, growth rates began to decline in the 1980s and fell sharply after 1990. This occurred as a result of the disruption of the centrally planned system and price liberalization in trade relations within the former Soviet Union. With independence, the Republic of Moldova began facing a set of political, economic, environmental and social problems. The process of state building and self-determination was going in a context of social and economic crisis, and radical transformation of the economic system. A switch from the centrally planned economy to the market economy was executed energetically in all main areas, including price liberalization, foreign trade and investment, opening up the internal market, mass privatization, land reform and formation of a new banking system. However the consequences of the reforms, and their effect on social development and environment were not accurately predicted; no account was taken of the low level of preparedness of the people and of economic agents to live and act in the changing circumstances. Thus the practical results of the reform to a large extent failed to meet expectations of society and government.

The mass privatization of the state property did not justify the aspiration in the emergence of a new class of owners interested in the development of production by increasing competitiveness; renovating and modernizing fixed assets, comply with the environmental obligation, attracting investment and quality management.

In 2000, the Moldovan economy moved onto a growth trajectory. From 2000 to 2003, GDP rose by 24,1%, industrial output by 54,1%, and investments in fixed capital by 21,5%. The economy entered the period of upturn with a new structure. As a result of implementation of reforms, the non-state sector became dominant. In 2002, its share in GDP was 75%, with a share of over 80% in industrial manufacturing, over 95% in retail trade, almost 100% in the agrarian sector, and 54% in the sector of paid services. The correlation between major economic sectors remains unfavourable – agriculture in 2002 accounted for 21,0% of GDP and nearly half of all employed in the economy (49,6%), industry accounted for 17,3% of GDP and a bit more than one tenth of the employed (11,4%). However, economic stabilisation and growth was not reflected in improving the environmental management.

Differentiation of the economic potentials of the capital and regions is caused by the degradation of industry and infrastructure of smaller cities during the 1990 crisis, and by the low efficiency of the agrarian sector in regional economies, resulting in an absence of necessary conditions and resources for development, including environmental consideration. The rural communities are very significant poverty epicenters, which generates environmental concerns with impacts on the population health and well-being, which results in increase of rural poverty driven by the environmental cycle. Moldova is one of the poorest countries in Europe, with a per capita income of US$543 and over half the population live on from one to a few US dollar equivalent per day.

The social crisis was even deeper and more dramatic than the economic one. With large-scale release of labour from the economy, high inflation and falling real state expenditures for social needs, the losses of the population were limited not only to narrowing income resources and declining purchasing power, but also to a diminished ability to enjoy social assistance from the state, in the form of benefits and free social services.

Poverty in the 1990s grew in association with reductions in national output, investment, employment, and degradation of physical and biological environment, damaging of infrastructures, neglecting of environmental obligations and decrease of real income of the population. As with many countries in transition, poverty is a multidimensional phenomenon, but

because of its geographical and geo-economic and geo-political location, Moldova has specific features, which have amplified its vulnerability to poverty. These include regional economic crises, sensitivity to natural disasters, political and social instability, territorial separation, etc.

Poverty has been increasing during the past decade due mainly to the drastic slowdown in remunerative economic activity, coupled in the countryside with several years of poor harvests. The degree of poverty has been also affected by recession in education, health and other public services. Poverty is the most severe in rural areas of Moldova where the share of poor people is 23.3% as compared to 6.9% in Chisinau and 16.8% in other cities of Moldova.

One of the most severe economic problems is the growing gap between the living standards of the urban and rural populations. In 1998 the average per capita income of urban population was 23% as much as the country's average, while in rural areas it was 13% less. Within 1994 -1998 the difference of income between urban and rural people increased from 23% to 34%. In 1998 about 20% of rural families lived in poverty while only about 11% ensured more or less sufficient living.

- **Population and demography**

The current demographic situation in Moldova is a product of both long and painful transition (resulted in economic decline, poverty and social exclusion of large population groups), and a number of other social, political, behavioral and cultural factors**.**

According to survey performed in October 2004, the country's population is 3.388 million excluding the Transnistra region. About 39% of population lives in urban areas. The largest city is the capital Chisinau with a population of about 700,000. Other large cities are Tiraspol, Balti and Bender.

Moldova is one of the most densely populated countries in the region with 128 inh/km^2 but with a marginal population growth. In 1996, the share of rural and urban population stabilized at 54% and 46%, respectively. The trend of urban population growing now seems to be reversing as a result of diminishing employment opportunities in towns.

The birth rate diminished significantly as compared to the early 1990's. In 2004, the birth rate was 11.3‰, while the mortality rate reached 12.3‰. At present, the natural population growth also shows a negative value (-1.0‰). It is also worth to mention that mortality rate has a growing tendency; this indicator is higher for manhood as compared to womanhood and much higher in countryside than in urban areas.

In 2004 the economically active population was 1.433 million what showed for the year 2004, a 3% decrease as compared to the previous year. The official number of economic emigrants is 345,000 persons, which makes up 24% of the total active population over 15 years old. Two thirds (67%) of the economic emigrants are men, 69% are rural residents.

In 2004 the number of unemployed people exceeded 116,000. In 2003 the general unemployment rate was 8.1%, as compared to 7.9%; it was reportedly higher in urban (11.9%) than in rural areas (5.0%). There are clear gender disparities for unemployment (men - 10.0%; women - 6.3%) however, among young people (15-24 years) it has a downward trend (from 22.3% in 1999 to 19.7% in 2004). In 2004 the share of unemployed young population was 26.5%.

- **Land-use**

According to Land Cadastre the agricultural lands occupy 2 284 951 ha, that makes 75,0 % from the total land surface. Forests occupy 394 411 ha, or 2,9 % from the total surface. The overall land-use pattern in Moldova is reflected in the table below.

Land-use	Total	Including:					
		Agriculture	Forests	Wetlands	Waters	Ravines	Landslides
in ha	3048123	2284951	394411	19669	67922	7695	24207
in %	100	75,0	12,9	0,64	2,23	0,25	0,79

Current land ownership is characterized by three major categories: (i) agricultural enterprises (approximately 1,200 per 1,000,000 ha); (ii) farmlands resulting from privatization after 1991 (300,000 per 500,000 ha), and (iii) homestead lands (1,000,000 on 350,000 ha)

- **Transport and road infrastructure**

In Moldova the structure of transport is disproportionate: the share of road transport in goods and passengers transportation is 88%; 11% are transported by rail, and 1% by other types of transport (mainly air and water ones). During last 15 years the transports evolution followed the general economic decline. Increased economic activity starting in 2000 entailed the transport growth. The share of road transport in the total transport structure mostly increased at the expense of steady growth of transport units.

Increase of road transport units in the Republic of Moldova in 1990-2004 is shown in the table below[5].

Transport units	1990	1995	2000	2004
• Lorries	76910	59888	61689	79387
• Buses	11035	9181	14023	21853
• Cars	208984	165941	238380	330479

Road density in Moldova (2,41 measured per 1000 population and 0,31 km measured per square km) is two times as less as in neighboring countries - Romania (6,59 and 0.65, respectively) and Ukraine (5,6 and 0,45, respectively). More than 70% of the country's road network is mostly poor rural roads. It was shown that Moldovan farmers (particularly in the central and southern parts of the country) are unable to sale about half of their products due to poor access the market places, or lack of road access of wholesalers to the settlements, and also due to inadequate road conditions. About 40 settlements have no access to the national road network and, during wet weather and in winter, are temporary isolated from the rest of country. In 2002 Social Assessment performed by the WB in 35 rural communities, showed that respondents mentioned poor road conditions as a second severe problem faced by their community (after the need for potable water)[6].

In contrast with the growth of vehicles number, the road network remained almost unchanged as indicated in the table[7] below. The financial resources allocated for road maintenance and traffic security are desperately low and did not exceed 7-10% of the necessary investments.

Type of road	1990	1995	2000	2004	2006[8]
Total roads	10300	9400	9400	9332	10537
• including asphalt roads	8970	8900	8800	8905	5349
Main roads	2800	2800	2800	3325	3665
Local roads	6530	6600	6600	6007	6886

In 2002 the conditions of national roads were evaluated on a stretch of about 2,000 km, and obtained results may be extrapolated to the entire national road network. The evaluation

[5] State of Environment of the Republic of Moldova, 2005
[6] Moldova: Transport Strategy Update With Emphasis on the Road Sector, December 2002, World Bank
[7] State of Environment of the Republic of Moldova, 2005
[8] Data for year 2006 is from the State Road Administration, www.asd.md

showed that in 1992 about 70% of the road network was in good or fair condition and only 30% of roads were poor; in 1998 only 45% of roads were good or fair and 55% was poor or extremely poor. At present the situation with road conditions severely changed: only 30% is good or fair and 70% of the network is poor or extremely poor. 78% of the national roads and 88% of the local roads have exhausted their exploitation capacities and are technically obsolete. This very explains their exponential deterioration over last and coming years.

In 2006 length of public roads slightly increased (see table above) however their quality have deteriorated. Presently, length of trunk-roads is 1075 km, republican roads – 2590 km and local roads – 6886 km. Types of national road pavement are distributed as follows: asphalt – 2753 km, concrete – 437 km, bituminous – 214 km, macadam – 261 km. Type of pavement of local roads (total length – 6866 km) are distributed as follows: asphalt – 2596 km, concrete – 46 km, bituminous – 468 km, macadam – 3161 km, earth – 595 km[9].

- **Territorial-Administrative Structures**

In conformity with territorial-administrative reform after the year 2003, Moldova is divided into 32 raions, Autonomous Territorial Unit Gagauzia (ATU) and the breakaway region of Transnistria (whose status is still disputed). There are 5 municipalities (Chisinau, Balti, Comrat, as well as Tighina/Bender and Tiraspol situated in Transnistria), 65 towns, and 1615 communities and villages on the territory of Moldova. The municipalities are administered separately from the raions.

2.3. Cultural and Historical environment

- **Nature as a patrimony**

The natural patrimony of the Republic of Moldova includes important natural sites and picturesque landscapes, which represent an intrinsic value but also a potential tourism resource. Many of representative sites have been offered a protection status (one of the 12 categories of natural protected areas). About 15,000 historical and cultural monuments have been identified so far in Moldova dating from different historical époques. Out of those, 5698 sites are included in the official Register of monuments under state protection, including 891 ecclesiastic buildings, two medieval fortresses (Tighina and Soroca), 17 castles and parks, 52 cave monasteries, and about 700 urban architectural monuments, and a large number of archeological sites, some of them of international significance.

In the context of natural patrimonial site the road sector may consider historical heritage, tourist sites and scenic natural beauty for further development.

- **Ethnicity**

Moldovans constitute a majority in the country (64,5% of the total population). Ukrainians and Russians make up 13,8% and 13,0%, respectively. The rest are mostly Gagauzians and Bulgarians. Within the rural population the share of native Moldovans is higher. The Gagauzians mostly live in south of the country and are administratively autonomous. The Russians and Ukrainians are mainly concentrated in major cities and the Transnistria region. Besides, the population of a few villages in the north is practically fully represented by Ukrainians.

Consideration of minority's heritage and culture may be important in some section of roads under further improvement of the overall road sector in Moldova.

- **Culture**

The Republic of Moldova has a long history of cultural traditions in the field of cultural infrastructure, education, art, music and folklore. The cultural fabric of the country had been

[9] State Road Administration, www.asd.md

developing over a long period as a result of a number of factors including ethnic heterogeneity, impact of foreign influence (Turkish, Greek, and Slavic), western media, a high degree of ideological inculcation, and a high percentage of rural people. Changes that took place during the transition period have brought some modifications into the structure of society. The rural traditions in folk arts and crafts represent a cultural expression of the fundamental ethnic values of the Moldovan nation and contribute to maintenance of its national identity. The revitalization and development of these spheres is fundamentally important. Although valued, products made by local craftsmen such as knitwear, embroidery, carpeting, artistic weaving and ceramics have no market in the country because of the low purchasing power of the population.

For the road sector it is important to consider local values and sites occupied by local craftsmen in order to provide access to market places and incorporate cultural elements as overall road design and beauty.

- **Health and Education**[10]

In Moldova average life expectancy (70.7 years for female and 63.2 years for male) is one of the lowest in Europe. Cardiovascular diseases are the single major cause of death and the rate is higher for manhood. Children's health in general has deteriorated. Underfeeding affects substantial part of population but the most severely - children. Infant mortality is high, and is three times as much as the average in European. The rate of infectious diseases is also high (cholera, measles and smallpox) and the index of gastrointestinal diseases is the highest in Europe. The incidence of syphilis has increased 10,6-fold between 1990 and 1997. HIV/AIDS cases have increased from 47 reported in 1996 to 408 cases a year later. The growth of number of cardiovascular diseases, stroke, rheumatism and diabetes shows a real threat especially among young people. About 8% of the population suffers from health problems caused by excessive alcohol consumption. Average annual growth of registered drug addiction is 30%.

In 1989 the literacy level of the adult population was 96,4%. The share of adult population with higher and/or secondary education was about 70%.

- **Relationship with Natural Resource Base**

Poverty mostly has stricken the rural population which has to rely on the land resource base to survive. The land provides rural families with daily food and surplus food for making living. The groundwater resources provide water for domestic use. Local surface water resources (ponds, reservoirs, small rivers) are strongly affected by soil erosion, contaminated runoff from the earth surface, waste water discharges and unauthorized waste disposals/ dumps. Nevertheless, they remain an important local resource for livestock watering, fishing, commercial fish farming, maintaining domestic waterfowl, and recreation, especially children. Share of grazing areas is limited in the most of villages, and local authorities usually designate for this purpose the less productive lands, including road surroundings. Due to lack of pastures other areas such as forests, wetlands and roadside plantations are often under grazing pressure. Forests and even individual trees are important sources of firewood and local building materials. In forested areas mushrooms and flowers, some which are rare, are collected for sale to get additional home income. Forests provide a source of medical plants and materials for basket weaving. Clay and sand deposits, and reed if located closely to the village, are a source for building materials in villages.

All aforementioned aspects shall be considered in development of the road sector in Moldova.

[10] National Human Development Report, UNDP, 1998.

3. Policy, legal and regulatory framework for environmental and road sector

3.1. National Policy and Regulatory Frameworks

National environmental and road sector policy and regulatory frameworks were analyzed on the three-levels basis documents (i) environmental, road and other associated strategies, programs, policies and concepts, (ii) legislation and (iii) specific by-law regulations (standards, requirements, rules). The most emphasis was placed on Environmental Impact Assessment and Ecological Expertise procedures and requirements which were described in separate sub-chapter.

- **Programs, Policies & Concepts**

Government of the Republic of Moldova approved several national strategies and programs related to environmental protection and sustainable development both in the field of environmental protection and roads construction, operation and maintenance. Some of them may be relevant to the proposed operations.

EU-Moldova Action Plan, 2005, presumes work out and implementation of the national transport strategy, including development of transport infrastructure (item 57) and implementation of selected measures and reforms in the road transport sector (item 58).

Concept of Organization and Development of Automobile Transport in the Republic of Moldova, 2006, determines and establishes complex of priorities, strategic goals and priority actions towards development of passenger automobile transport until 2010. As a basic principles of economic, social and cultural system of Moldova, the system of automobile transport aims at satisfaction of consumers' needs in the field of transport on a qualitative level in conditions of safety of transportation, road traffic and environment, as well as complying with technological requirements.

Concept of Forming and Development of National Network of International Transportation Corridors, 2002, allows to consider possibility to finance the development of national transportation network infrastructure while approving of state budgets. Tentative estimates show that in period 2001-2015 on major overhaul the Moldavian sites of the international road corridors will be about 174 million US dollars. Through territory of Moldova will pass VII and IX all-European transport corridors. Within the framework of European agreement on territory of Moldova will also pass 4 international highways of international road network "E": including road directions West-East E58 (Vienna-Bratislava – Zvolen – Cosite - Uzhgorod - Mucacevo - Halmey - Suceava - Iasi - Chisinau – Odessa - Nikolaev - Kherson - Melitopol - Taganrog – Rostov-on-Don and 3 connecting roads: E 577 (Poltava - Kirovograd – Chisinau - Giurgiulesti - Galati – Slobozia); E 581 (Marasesti - Tecuci – Albita - Leuseni - Chisinau – Odessa); E 583 (Roman - Iasi – Balti - Mogilev-Podolsk - Vinnitsa – Zhitomir).

In relation to socio-economic issues the Concept declares that implementation of large-scale transport projects will promote attraction private investments, including foreign ones, which volume can be estimated from 3 up to 8 million US dollars one year.

Concept describes some ecological aspects for developing road corridors and states that "… creation of the national modern network of international transportations must significantly reduce negative impact of vehicles on the respective territories". Maintenance of appropriate traffic conditions on highways, standardized speed, exception of delays and unforeseen changes of a traffic mode will cause significant reduction of harmful emissions into air. For the account of constructing lines of highways outside of localities, regulations of building in a zone of their influence, observance corresponding parameters in the plan and a longitudinal structure

considerably. Harmful influence of noise from traffic of motor transport will decrease. In case, if settlements are situated close to highways, anti-noise barriers should be necessarily built up in them.

Last years preparation of several road and transport infrastructure programs and strategies had been initiated and drafted.

At the initiative of the President the **"Moldovan Roads in the 21-st Century Program"** was developed. The main objectives of that Program are to protect Moldova's core national road network from further deterioration and create an adequate institutional and financial framework for the sustainable development of road infrastructure and transport services[11]. In order to support the program the draft **"Road Transport Infrastructure Sector Strategy"** was developed by SRA. The objectives of the strategy are: (i) to improve conditions of the existing public road network; (ii) to establish the financial and technical environment to bring the road network to the level of European Standards; and (iii) to develop an express road network in stages, based on detailed feasibility studies. In a short-term, the strategy aims to achieve (i) rehabilitation and maintenance of the road network to stop its exponential degradation; and (ii) change relevant laws towards infusion the road administration autonomous status, with its own financial sources. The long-term strategy (2004-2013) envisages to bring the main national road network (approximately 400 km) to the level of European standards and to bring the remaining national road network (2000 km) as well as the main network of local roads (750 km) to adequate and maintainable condition. It also foresees the gradual development of an express road network for the country's main axis, in correlation with internal and transit traffic growth. This strategy is sound and its implementation should start as soon as possible[12]. The main provisions drafted will be applied for preparation of **Transport Sector Program for 2008-2017** which will include a Transport Sector Strategy and a prioritized 10-year Transport Investment and Expenditure Plan.

Concept of New Environmental Policy of the Republic of Moldova, 2001.

Main objectives of a new environmental policy are: (i) to co-ordinate the environmental policy priorities with socio-economic changes in Moldova and with global and regional tendencies, programs and plans, (ii) to prevent and reduce the effect of economic and any other activities on the environment and natural resources and (iii) to ensure ecological safety of population. There is no specific aspect related to the road and transportation is included.

Concept of Sustainable Development of Localities in Moldova, 2001.
The main goal of Concept is to promote introducing of principles of sustainable development in the process of elaboration of documentation on town-planning and territorial development and its implementation *inter alia* by means of protection, conservation or evaluation of the national heritage value. Main objectives of the Concept are: establishment of favorable and stimulating conditions for settlements development; creation of modern living environment for all categories of population; improving of architectural and town-planning appearance of settlements; applying relevant international standards; implementing the integration of all sector programs at micro- and macro territorial levels; providing for the economic, social and environmental linkages between cities and their surrounding regions; involving population in decision-making process in the field of town-planning, territorial development and environmental protection.

Economic Growth and Poverty Reduction Strategy, 2003-2007.
The strategy was elaborated to ensure the welfare and decent living conditions for the citizens by means of a sustainable economic growth. Among major objectives of the Strategy are to achieve acceptable social-economic level and increase welfare of the population. The foundation of this Strategy can only be a sound and solid infrastructure. While infrastructure and

[11] Moldova: Transport Strategy Update with Emphasis on the Road Sector, World Bank, December 2002
[12] Moldova: Transport Strategy Update with Emphasis on the Road Sector, World Bank, December 2002

in particular transport cannot claim to be a cost-effective policy instrument for the redistribution of welfare to the poor, it reduces absolute poverty mainly by increasing economic efficiency - by lowering costs and prices and enhancing opportunities. Efficiency improvements in transport investments and infrastructure management could free up scarce resources and make the country's traditional sectors more competitive and enhance the country's comparative advantages in trade and transit traffic.

National Program on Securing of Ecological Safety and Action Plan, 2003.
Ecological safety is such a state of environment when majority of natural and anthropogenic impacts do not cause changes which immediately or afterwards may result in degradation of environmental ecosystems and affect adversely on human health. As compounds of ecological safety are considered sectoral impacts (industry, agriculture, power engineering, transport etc.), general types of activity (transboundary contamination, wastes generation), extraordinary situations (floods, landslides) and organizational activities (monitoring, risk assessment, ecological insurance, prevention and warning system, international and regional cooperation) and described actions to be taken to secure ecological safety.

- **Basic legislation (Laws)**

Law on Environmental Protection, 1993, amended in 1997
It is a basic law that provides general framework for the environmental protection in Moldova and options for sustainable development. It established a legal foundation for developing normative acts and regulations applicable to different environmental media in order to *inter alia* protect land, underground resources, water and air from chemical, physical and other pollution, and also from other impacts. The law sets the basic principles of environmental protection, including the priority of environmental goals, mandatory environmental compliance, environmental liability, prohibition of implementation of any programs and projects without a positive conclusion of the state ecological expertise and concurrence by population in the area of impacts, payments for use of natural resources and charges for non-compliance with environmental protection requirements. According to the Law the projects related to construction, re-construction and modernisation of public facilities are subjects of ecological expertise procedures. The Law also stipulates that irrespective of type of ownership, economic agents are obliged to obtain permit from ecological expertise for use of natural resources and extend it in a fix term; take measures toward prevention of landslides, soil erosion and compaction, introduce low-wasting and resources-saving technologies.

Water Code, 1993, revised and amended in 2003
The Code contains provisions to ensure sustainable water use, protect water resources from pollution, contamination and depletion as well as prevent negative impacts of polluted waters on human health. It established that sitting, design, construction and launching into operation of any new or reconstructed facilities and other objects is permitted only after completion of a state sanitary-epidemiological expertise and only when such facilities have water purification and pollution prevention devices.

Land Code, 1991 revised in 1993, 1996, 1997, 1998, 1999, 2000

It is one of the basic law regulates land relations in the Republic of Moldova. It proclaims protection of land to have higher priority than other types of land use activity. The Law stipulates that the State shall financially and administratively support inter alia development of various types of effective land management and use, including those aimed at reducing land pollution by waste, and research regarding interrelationships between environmental and land protection. The Law requires routine coordination with a national environmental authority regarding any plans for land development and construction, instruct all industrial, communal and other land users and owners to prevent any negative impacts of agricultural lands. The Code establishes different types of land based on the purpose of their use and mandates respective

protection regimes and stipulate that land protection measure shall be elaborated and implemented at planning, design, construction and operation or various facilities and technologies. The Code prohibits launching into operation any facilities and technologies that do not protect land and also stipulates that in order to protect land quality, environment and health of people, maximum permissible concentrations of chemical, biological and other active substances in soil shall be elaborated and approved by separate legislation. The Law stipulates that while designing, siting, constructing and putting into operation new and re-constructed objects as well as installing of new technologies affecting land conditions, actions directed at land protection must be considered and taken. Put into operation objects and use of technologies that do not ensure land protection against degradation and damage are prohibited

Forest Code, 1996

The Code is one of the basic legal act focusing on creation of legal grounds for different aspects of forests management and included: provisions for management of forest and hunting funds, use of forest lands, rights and obligation of forest managers and forest users, forest production, taxes, charges, financing and economic stimulus, reproduction of forests; protection of forest fund, state register, cadastre, monitoring, etc. The Law stipulates that design, placing, constructing and putting into operation new and re-constructed objects that may adversely affect forest conditions and rehabilitation, activities aiming at forest protection should be compulsory envisaged and implemented in coordination with central forest protection and environment protection agencies. Such projects are implemented only on the basis of requirements provided by the Law on ecological expertise and environmental impact assessment.

Law on Air Protection, 1997

The main objectives of the Law are maintenance of clean air, improvement of air quality, prevention and mitigation of harmful physical, chemical, biological and radiological impacts on air quality, and accordingly protection of human health and environment. The law establishes competence of various ministries and departments in the field of air protection; participation of juridical and physical persons in actions directed at air pollution prevention; normative (standards) of air quality; regulation of measures to be undertaken toward protection of air against pollution, etc.

The Law on Regime of Harmful Products and Substances, 1997, amended in 2002

The Law establishes role and responsibilities of the Government, Ministry of Healthcare, Ministry of Agriculture, Ministry of Ecology and Natural Resources, State Emergency Department and other ministries and local authorities, and describes the regime of harmful products and substances (licensing, production, storing, transportation, use, registration, neutralization, import and export).

Law on Wastes of Production and Consumption, 1997

The Law provides basic principles in the field of waste management. In conformity with the Law on Environmental Protection this Law regulates management of wastes generated during the process of production and consumption, and aims to reduce and prevent environmental pollution.

Law on State Land-Tenure Regulations, State Land Survey and Land Monitoring, 1992

The Law establishes main principles of state land-tenure regulations: use of land resources for society's benefit; introducing of advanced methods of economic activity, and functions of the State Land-Tenure Regulations Service: substantiation and delimitation of land plots' boundaries; development of projects on land demarcation for its reder into use; regulation of existent lands' boundaries, delineation of plots and preparing of documents for land render into use, etc

Law on the Payment for Pollution of the Environment, 1998.

The goals of this Law are to create such a system of economic activity that makes unprofitable any damage to environment, encourage introducing of non-polluted technologies, undertake measures aimed at minimizing volumes of pollutants emissions and discharges into environment and generation of production wastes, stimulation of activities oriented to improvement of environmental quality.

Law on Sanitary-Epidemiological Protection of the Population, 1993, amended in 1996, 2004.

The Law indicates that planning and construction should envisage a creation the most favorable conditions for habitation and health of population, improvement of localities, prevention and liquidation of harmful effect on environment on human health. Land plots acquisition for various objects and putting them into operation are permitted only on the basis of resolution of the state sanitary-hygienic entities.

Law on Permitting of Certain Kinds of Activities, 2001

The Law aims at ensuring of the state control over compliance with requirements and conditions to be adhered while fulfilling certain activities. It determines legal, organizational and economical basis for certain kinds of activities and establishes kinds of activities which require permits. The list of activates liable to permitting *inter alia* includes design of all kinds of buildings and reconstruction works.

Regulation on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters, 2000.

The Law regulates different aspects of informational management, including relations between providers and consumers of information; principles, rules and regulations of informational exchange and provision for that; aspects of personal requests and confidentiality; protection of rights of providers and consumers of information.

Law on Quality in Construction, 1996.

The Law determines juridical, technical, economic and institutional aspects related to the construction activities by juridical and physical persons, their obligations and rights related to the quality in construction. The Law stipulates that construction, modernisation, strengthening, repair/ renovation are implemented only in accordance with project documentation worked out by physical and juridical persons authorised for such kinds of works and verified by authorised specialists in the field; design and construction of buildings/ and production used in constructional material is implemented by physical and juridical persons licensed for activity in the field; formal acceptance of facilities is implemented by investor in a presence of designer and executor of the work and/or appointed representatives of above specialists in conformity with a law. As interference into construction are considered actions on rehabilitation, strengthening, re-construction, enlargement, partial destruction and repair which are implemented only on the basis of a special project which was elaborated in the established order and co-ordinated with initial project designer or according to resolution of a technical expertise carried out by authorised expert.

Law on Roads, 1995

The Law stipulates that design of roads and carrying out the road works are implemented in accordance with norms and technical rules elaborated and approved in established order and while designing of roads their functional indications, technical category; economic, social and defence factors of the country; conditions of rational use of land and environment protection, town-planning issues and territorial development are considered. The Law also stipulates that alienation of lands for road construction as well as order of compensation for damage to allotments owners is implemented in accordance with a law.

Law on Transport, 1997
The Law stipulates that that transport enterprises and facilities shall ensure sustainable use of land, prevent water-logging, reduction of land quality and soil contamination, prevent erosion and landslides and comply with environmental legislation. It instructs transport enterprises to protect the environment from negative impacts of transport activities, ensure compliance with environmental legislation, standards, and labor norms as well as certify transport activities and facilities in accordance with applicable international standards. The Law prohibits sitting of transport facilities, which handle explosives, flammables, radioactive, poisonous and toxic substances, close to residential areas and protected natural territories. Appropriate minimum distance shall be approved by special legislation and norms.

Motor Transport Code, 1998
The goal of the Code is regulation activities in the field of motor transport and determination of rights, obligations and responsibilities of transport entities (agents), providing motor transportation services, as well as physical and juridical persons used such services.

- **Government Decision, Instructions, Standards**

Government Decision on Approval and Introducing of the State Sanitary-Epidemiological Rules and Standards for enterprises producing asphalt-concrete mixtures, 2006. The Rules aims at improvement of sanitary-epidemiological control over this activity. Requirements towards enterprises making asphalt and concrete production and are obligatory for execution by all economic agents irrespective of administrative submission, ownership and way of managing and cover stages of designing, construction, reconstruction and operation are established.

Government Decision on increasing of exploitation safety of buildings and constructions, installations and pipe-lines which are sources of a heightened risk, 1996. In relation to the field may be mentioned next items: continuous supervision over technical conditions of economic objects that are sources of a heightened risk during their operation/ exploitation must be ensured; central administration and local public authorities which supervise economic objects exercise control over their technical conditions during their operation/ exploitation; works on expertise, design and rehabilitation of objects of a heightened risk are financed at the expense of economic objects funds. The risk category enterprises are defined and include – entity that may have accidental chemical pollution risk, entities that have explosion or flammable substances, deposits of oil, liquid and solid combustible substances, etc.

Government Decision on verifying of projects and executing of construction works, technical expertise of projects and constructions, 1996. While projects verifying, it is compulsory to ensure minimum level of quality envisaged in normative documents requirements in force. In the contract investor may set higher level of quality that it was implied in normative documents. Projects of all capital and temporary constructions shall be a subject of verification in dependence on their importance; projects on modernisation, changes, re-construction, strengthening, repair and engineering also are subject of verifying. Works on repair of non-supporting or decorating constructions of any degree of importance (roads, paths etc.) in case they do not deteriorate conditions of construction and do not affect on resistance are not a subject of verification.

Government Decision on state sanitary-epidemiological supervision in the Republic of Moldova, 1995, provides sanitary-epidemiological supervision over carrying out of activities and adherence to sanitary-hygienic norms and rules.

Sanitary Rules on atmospheric air pollution prevention in localities, 1998, prohibits siting, constructing and putting into operation objects that are sources of air pollution on the territories where registered level of air pollution already exceeds admissible values.

State Standard GOST 17.2.3.01-86. Nature protection. Atmosphere. Air quality control regulations for settlements provide the rules for air quality monitoring. The number of monitoring points is defined in a view of population number, the area when settlement is situated, as well as a network of roads with intensive vehicles traffic and their arrangement on the towns' territory. The Standard includes also the program and terms of supervision, sampling rule and characterization of air pollution.

Temporal Construction Norms 9-79. Guide for environment and land tenure protection measures for reconstruction of motor roads in Moldova, 1979. The Guide include: (i) general provisions, (ii) methods of reconstruction of roads in a plan and longitudinal structure; (iii) reconstruction of road stretches in settlements; (iv) methods of hydro-meteorological substantiation and water drainage from the roads, (v) actions towards prevention of noise arising from vehicles traffic, (vi) maintenance of slopes stability and landslide sites, (vii) requirements for feasibility report on roads reconstruction, (viii) method of estimation of damage to natural environment, (ix) feature of a substantiation of roads elements during reconstruction, (x) methods for noise impacts assessment; (xi) calculation of harmful components of gases in air; and (xii) an estimation of transport safety in towns.

Construction Rules D.02.01-96. Road and bridges: Requirements for environmental protection during design, construction, rehabilitation, repair and maintenance of roads and bridges, 1996. The document was developed by MTRI. It is intended for use during design, construction, repair and maintenance of roads. Some requirements are recommended, other requirements are compulsory. The document includes: (i) general provisions, (ii) protection of land resources, (iii) coordination of roads pathways with a landscape, (iv) protection against transport noise, (v) protection against pollution, (vi) protection of geological conditions, (vii) fauna and flora conservation, (viii) hydro-meteorological factors, (ix) liquidation of consequences of accident pollution.

Temporary Construction Norms 18-74. Instructions on architectural and landscape design of roads, 1975. Architectural and landscape design of motor roads represents a complex of requirements and recommendations which should be considered at all stages of design, construction, maintenance and repair of automobile roads. Four main indicators should be considered: (i) spatial tracing, providing smoothness and clearness for the driver with a view of convenience and traffic safety; (ii) visual orientation, providing visual reference points allowing drivers to expect at a great distance changes of a road trajectory and conditions; (iii) incorporation of roads in a landscape for improvement of movement convenience, disclosing of beauty of a local landscape; (iv) improvements of a landscape by gardening, installation of road's equipment.

Construction Norms and Rules 2.05.02-85. Motor roads. The document applies for designing of new and reconstruction of existent motor roads. The document includes: (i) general requirements, (ii) organization of traffic safety, (iii) environment protection, (iv) basic technical norms, and transport and exploitation parameters, (v) crossings and adjunctions, (vi) earthen cloth; (vii) road covering, (viii) bridges for pipe and tunnels, (ix) arrangement of road protection constructions, (x) buildings and constructions of road and motor transportation services.

The environment protection section obliges to consider during design a degree of impact from road on environment both during construction and operation, and also combination of road in a landscape having preferred decisions which render minimum impact on environment. On roads in bounds of water protection zones it is necessary to provide organized water discharge from the roadway surface with its subsequent clearing or removal in the places to exclude pollution of water supply sources. For places of unstable and especially sensitive ecological systems (inundated zones, a landslide slopes, etc.) it is necessary to provide measures towards maintenance of a minimum ecological balance and disturbance prevention. At suppression by a

roads of migratory ways of animals it is necessary to elaborate special measures towards providing of safe and free animals' movement. In case of excess of transport noise on constructed adjoining territory, it is necessary to provide special anti-noise actions (shaft, barriers and planting of special green trees).

Construction Norms and Rules 3.06.03-85. Motor roads. The document applies while physical constructing works of new roads and reconstructing of existent motor roads. It describes requirements for all technical parameters for covering of roads. The main items are: (i) organization of road-building works, (ii) cleanup activities, (iii) constructions of an earthen cloth, (iv) arrangement of additional layers of the bases and intermediates, (v) arrangement of asphalt-concrete coverings and the bases, (vi) arrangement of conditions of roads, (viii) quality assurance and acceptance of executed works. The document is supporting by the set of materials included in three manuals:

1. The manual on the arrangement of superficial processing on roads;
2. The manual on application of asphalt-concrete covering and bases for roads;
3. The manual on construction of coverings and bases for roads from soils, consolidated by binding materials.

3.2. National requirements for Environmental Impact Assessment and Ecological Expertise

Moldova has its own relatively well developed legal and institutional framework for Environmental Assessment. The major provisions are included in the **Law on the Environmental Protection, 1993, amended in 1997.** This framework Law introduces the concept of state ecological review (literally, state ecological "expertise" - SEE) which seeks to examine the compliance of proposed activities and projects with the requirements of environmental legislation and standards and ecological safety. The law stipulates the mandatory cross-sectoral nature of SEE, which shall be scientifically justified, comprehensive, and objective and which shall lead to conclusions in accordance with the law. SEE precedes decision-making about activities that may have a negative impact on the environment and is compulsory for all economic activities which may have likely negative impact on environment regardless of their destination, property, investments, placing, source of financing, etc. Financing of programs and projects is allowed only after a positive SEE decision has been issued. According to the Law timeframe of conducting of ecological expertise for simple objects may reach 45 days, for complicated ones –3 months.

In 1996, the Parliament approved a special **Law on Environmental Expertise and Environment Impact Assessment.** This law covers all aspects of conducting EA for all planned development projects, which are subdivided into ones to be a subject of State Ecological Expertise (SEE) and ones to be a subject of Environment Impact Assessment (EIA) The Law established the specific procedure for planned activities that may have significant environmental impacts.

According to the Law, all projects fall under three main categories:

- First category – projects require full EIA before designing and can be further developed (detailed design) with only positive approval of EIA findings by the SEE;
- Second category – projects require ecological substantiation of project activities and a special environmental chapter to be included in the project design documents and respectively positive approval from SEE before construction, and
- Third category - the rest projects do not need to be passed through formal procedures of EIA and SEE.

- **Projects that required full EIA before designing and relevant procedures**

An annex to the **Law on Environmental Expertise and Environment Impact Assessment, 1996** contains regulations for conducting full EIA studies. The EIA procedures are only applicable to complex and potentially dangerous (to the environment) projects which could lead to significant impacts. There are thirty-two types of projects requiring an EIA. Among others, these include:

- construction of auto highways and high-speed roads (however, any specific criteria as length and type of roads, traffic intensity, etc were not established), and
- building of stationary asphalt-concrete plants (however, any specific criteria like plant capacity, etc. were not established)

The Ministry of Ecology and Natural Resources (MENR) may require EIA for other types and scales of projects on the case-by-case screening, but criteria and procedures for this decision are not specifically stipulated in the Law.

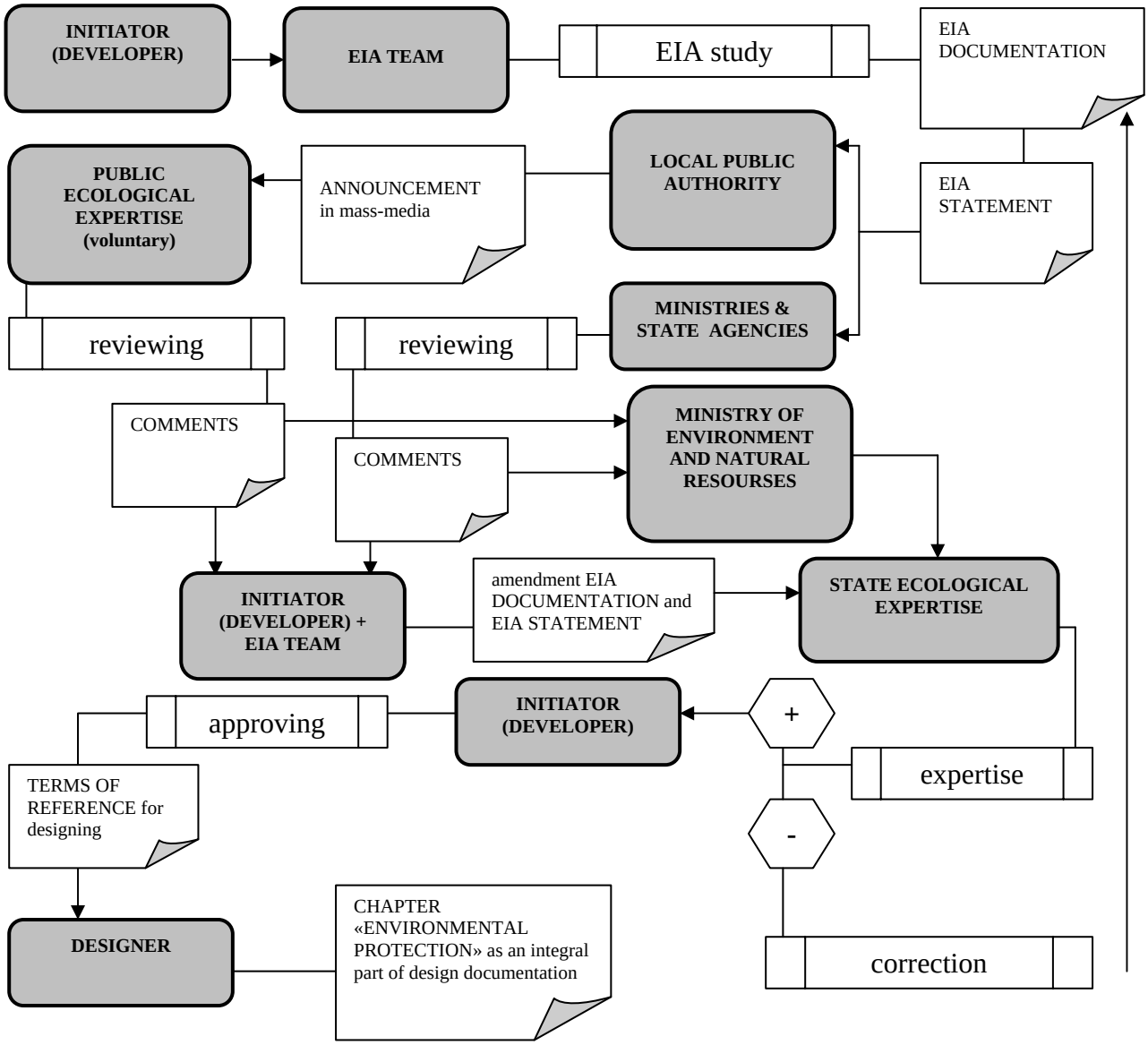
The EIA should be conducted at an early stage of the project, before designing stage. The EIA should be conducted by national certified experts (design institutes) following the defined methodology, report structure and documentation requirements.

The basic requirements for EIA study and documentation are stipulated in EIA Regulation, as well as requirements for EIA report (so called Statement on the Environmental Impact Assessment). The first requirement is that alternatives to the project and mitigation measures should be covered. As mentioned above, all alternatives of the project or any of its components should be comparatively analyzed, and the best option should be selected. The regulation requires that the “zero-option” or “do-nothing option” should be considered, as well. Measures that would exclude or mitigate the negative impact of the project, as well as those that would increase its positive impact should also be addressed. In fact, national legislation requires to adopt measures towards mitigation environmental impacts and rational use of natural resources.

The Statement on the Environmental Impact Assessment (SEIA) should be a subject of public and ministerial revisions. Corrected SEIA and other EIA documentations (additional reports, results of specific investigations, tables, maps, models, etc.) should be presented to MENR for revision as a part of SEE process (conducted by the Division for Pollution Reduction). The principal objective of the SEE is to check if all environmental standards/ principles are adhered, and environmental protection measures are addressed. A positive decision of SEE on the SEIA provides the official basis to initiate detail design of the project.

Once the technical and economic evaluation (feasibility study) and detailed design are prepared, it is again a subject of reviewing by SEE. The EIA findings including listing of mitigation measures and environmental management plan should be incorporated in the chapter “Protection of Environment” of the Design Report. At this stage SEE can be conducted either by the central office of the MENR (Division for Pollution Reduction), or by the central headquarter of the State Ecological Inspectorate (both situated in Chisinau) or by the Rayonal Ecological Inspections in dependence on the scale of the project and its economic significance. In addition to compulsory SEE, so called “ministerial” and/ or “public” expertise can be voluntarily applied.

The EIA procedure is generally a complex one. The steps to be followed for submission and approval of EIA are illustrated in figure below. The developer (initiator of the planned activity) is responsible for organization of EIA study, conducting of consultations and public hearings, presentation of EIA documentation and SEIA to the SEE, including financing.



To conclude, in conformity with national requirements, it is very unlikely that any sub-projects under Moldova's Road Sector Program, and in particular, under Moldova Road Sector Program Support Project shall not be a subject of full EIA study. The Moldova Road Sector Program Support Project will not include major rehabilitation or reconstruction of roads. Even in cases if some road sections are to be upgraded, rehabilitated, changed in trajectory, all these construction works may be carried out in bounds of existing road designated lands (so called road protection zones), and therefore these projects do not require full EIA study. The only concern is placing and operation of asphalt-concrete plants. It is strongly recommended that all these issues should be clarified during feasibility study, i.e. in time when all specific information on works and supporting infrastructure is available.

- **Projects that require SEE of design documentation and relevant procedures**

Other projects, which may have negative impact to environment, but not classified as "EIA required projects" will require applying of SEE procedures before construction. Procedures for conducting SEE are stipulated in upgraded **Instruction on Order of Organization and Conduction of the State Ecological Expertise, 2003,** which replaced previous **Instruction on the Organisation and Conduction of Ecological Expertise, 1996.**

Among general provisions of the instruction should be mentioned next: state ecological expertise is based upon laws, norms and ecological standards and fully determines ecological, economic, and social factors which affect environment before taking decision on economic and other activities. Basic principles of ecological expertise are: comprehensive examination of technical, ecological, social and economic parameters presented in documentation on planned economic activity with considering of regional characteristics, ecosystem conditions and their sustainability to planned impact, perspective of socio-economic development of the region; Priority goals of ecological expertise are maintenance of ecological balance, conservation of genetic fund and biological diversity, creation of favourable conditions for living, etc. Sections "Environment Protection" and "Environment Protection during Construction" in the project documentation should be developed only by specialists in these fields. Technical solutions, reflected in the submitted for SEE technical documentation have to be sufficiently substantiated in relation to reduction/ mitigation of impact on environment. The instruction is accompanied by a series of annexes, which describe in details (i) requirements for project documentation submitted to SEE; (ii) nominate subdivisions of MENR responsible for SEE in relation to the various types and scales of projects; (iii) requirements for every chapter or volume of project documentation, etc.

The planned and design documentation relevant to the road development should be presented for SEE approval according to following pattern:

Type of object or planned, design documentation	**Subdivision of MENR, responsible for the SEE**		
	Division for Environmental Pollution Prevention of the MENR	**Department of Ecological Expertise and Environmental Authorizations of the State Ecological Inspectorate (headquarter)**	**Rayonal Ecological Inspectorate**
Design documentation for the projects that have passed full EIA	+	or +	
Enterprises for constructional materials		+	
All types of deposits (warehouses)		+	
National and raional automobile roads, detour roads, streets and roads within the towns and raional centers		+	
Rural automobile roads			+

It should be pointed out that SEE of design documentation may be required for some of sub-projects which may relate to reconstruction of badly deteriorated roads or where modification of roads trajectory or significant rehabilitation works are to be carried out. All issues related to new deposits for constructional materials (if needed) and asphalt-concrete plants may raise requirements for SEE process to be applied. All these aspects should be clarified during feasibility study when all specific information is available.

In case if SEE is required the **Instruction on Order of Organization and Conduction of the State Ecological Expertise, 2003** should be consulted in details.

The list of basic requirements to volume and content of relevant to the field project and design documentation and materials submitted to organs performing SEE is presented in the table below.

N/n	List of documentation	Industrial enterprises (e.g. asphalt plant) & stockpiles	Motor (regardless of type)
1	**Project documentation:**		
1.1	Explanatory note, including:		
	• baseline information, needed for project and explanation for selection of site (or corridor)	√	√
	• Water supply and wastewater	√	
	• Ventilation & heating	√	
	• Storm sewage	√	√
	• Description of technology	√	
1.2	Design Documentation Chapter "Environmental Protection" with sub-chapters:		
	a. Air protection	√	
	b. Water resources protection	√	√
	c. Soil protection	√	√
	d. Flora & fauna protection	√	√
	e. Economic efficiency of environmental protection measures	√	
1.3	Construction Documentation with sub-chapter "Environment Protection during Construction phase"	√	√
1.4	Combined budget-financial report	√	√
1.5	Register of equipment certification	√	
1.6.	Materials on preliminary approved land acquisition for construction	√	√
1.7	Engineering-geological & hydro-geological research	√	√
1.8	Materials on soil research/characteristics of top-soil	√	√
1.9	Drawings (general plan, situation plan, site off engineering network and installations, etc.)	√	√
1.10	Materials on engineering protection (drainage, anti-erosion, etc.)	√	√
1.11	Design proposals (project) on observation regime wells	√	√
1.12	Design proposals (project) of irrigated lands	√	
1.13	Copies of technical conditions for engineering provision for:		
	• Water supply and canalization	√	
	• Heating supply	√	
	• Storm sewage	√	√
	• Gas supply	√	
1.14	Conditions for special water use	√	
1.15	Design proposals (projects) on environmental rehabilitation of quarries and land sites (corridors) impaired by construction	√	√
1.16	Measures (or design proposals) on use of excavated top-soil	√	√
2	**Documents on coordination of Project documentation with:**		
2.1	Territorial (specialized) design institute	√	
2.2	Local public administration	√	√
2.3	Urban/ raion architectural authorities	√	√
2.4	Raion ecological agencies/ inspections	√	√
2.5	Organs of state supervision, including coordination for:		
	• Sanitary protection strips of enterprises	√	√
	• Classification of wastes and methods of their utilization	√	√
	• Placing & designing of rakeouts	√	

N/n	List of documentation	Industrial enterprises (e.g. asphalt plant) & stockpiles	Motor (regardless of type)
2.6	State Geological Agency AGeoM	√	√
2.7	State Concern Apele Moldovei / ACVA	√	
2.8	State Hydrometeorological Service for:		
	• Background pollution concentrations	√	
	• Climatic conditions	√	
2.9	Fish inspectorate	√	√
2.11	Land Cadastre	√	√
2.13	Documentary acknowledgement from owner of polygon on potentiality to receive, stockpile and dispose wastes	√	
2.14	Documentary acknowledgement from owners of quarry/ borrow on potentiality of use of mineral priming needed for equalizing bed on construction ground	√	√
2.15	Documentary acknowledgement and characteristics of type of fuel used in boiler-room	√	
2.16	Document on results of conducted ecological expertise of new technologies and installations/ equipment (at least one from listed below):	√	
	• Conclusion of the Institute of Ecology		
	• Conclusion of leading (sectoral) scientific-research institute		
	• Acknowledgement from foreign company on ecological safety of technology and installation/ equipment or on exclusion of negative impact on environment		
2.17	Documentary acknowledge of efficiency of gas- and dust-catching installation/ equipment	√	
2.18	Permit for emissions of hazardous substances into air	√	
2.19	Fishery-biological basis of damage to fish resources from water intake and other installations	√	
2.21	Results of discussions with local people in regard to projected activities in the area of (for complicated objects)	√	√
3	**List of mandatory documents and materials included in project design package, including**		
3.1	Effective activities to prevent soil and underground water pollution as a result of object exploitation (collection, clean-up and use of surface runoff, settling of drainage systems, establishment of observation wells network, etc.)	√	√
3.2	Balance of raw materials, materials and outcome of finished products with considering of technological drains and production wastes including catched and emitted into air ones	√	
3.3	Solutions on wastes storing, disposal and utilization with considering of their volume and classification in conformity with toxicity degree. Documents on coordination of these solutions with organs of state supervision and waste polygon owner	√	√
3.4	Activities to be taken to mitigate impacts of hazardous emissions into air on physic-chemical and biological characteristics of soil, water bodies, flora and fauna	√	√
3.5	Activities to be taken to reduce specific water consumption for communal and industrial needs	√	
3.6	Natural water balance and water use balance in alignment of water intake site	√	
3.8	Activities to be taken on establishing and maintaining of	√	√

N/n	List of documentation	Industrial enterprises (e.g. asphalt plant) & stockpiles	Motor (regardless of type)
	water protection strip along rivers and water bodies and carrying out of economic activities within its bounds		
3.10	Results of analysis and prognosis of chemicals content in underground water and water supply source on adjacent to the object territories and settlements	√	
3.13	Activities to be taken towards prevention of likely accidents and elimination of their negative consequences	√	√

- **Projects that not require EIA and SEE of the design documentation**

Projects that do not meet criteria for full EIA study and SEE of design documentation can fall under this category. Normally, light rehabilitation of roads (most of sub-projects will rely on this definition), routine and periodic road maintenance, small repair/improvement of roads and relevant roadside works do not require SEE.

3.3. Other relevant guidelines and procedures

In 2004 there was complied an Operational Manual for the Moldovan Social Investment Fund to facilitate the activity of applicants, local public authorities and MSIF officers on the ensuring environmental sustainability over the whole cycle of subprojects implementation. In the frameworks of Operational Manual there were developed Environmental Guidelines to provide potential applicants, who are submitting micro-projects proposals (e.g. rehabilitation of country roads, small bridges, school building, local water supply sources and small-scale water systems, small-scale gas supply system, etc.) to Moldova Social Investment Fund, with essential environmental concerns to be considered as fully as possible while developing and implementing micro-projects. The Operational Manual may be used as a general guidance, showing environmental concerns and procedures also for road rehabilitation activities.

In 2006 MENR has prepared the Introductive Resource Kit on the Strategic Environmental Assessment in the Republic of Moldova with the financial support of the UNDP and technical assistance of the Regional Environmental Center (REC) for Central and Eastern Europe. It was the first attempt to comply a practical guide for potential users involved in developing of strategic documents in Moldova to incorporate environmental issues. The Resource Kit contains main steps and phases of Strategic Environmental Assessment, ways for its incorporation into the planning process and modalities for cooperation of different stakeholders from relevant program. It describes involvement of civil society in preparing of strategic documents, gives relevant examples on Strategic Environmental Assessment application in other countries, etc. The Resource Kit may be used as a guide for assessment of environmental issues related to the road strategic documents as Transport Sector Program or Transport Sector Strategy, both are currently under development.

4. Institutional framework and capacity to perform safeguards

4.1. National Institutional Framework

Road sector

The national competent authority for the road sector in Moldova is MTRI (formerly Ministry of Transport and Communications) which is a state agency of executive authority dealing with development of state policy and normative-legal regulations in the field of railway, motor, water and road management. The SRA is subordinated agency which is responsible for planning and assignment of construction and maintenance works. It prepares tender documents for new construction and major rehabilitation works. For a short time in 2001, the road administration existed as an autonomous and financially independent public road authority, which would obtain its revenues directly from the road users through a newly established "second generation" Road Fund. But after a few months of its activity, by Governmental Decision the public authority was transformed into a State Enterprise, subordinated to the MTRI[13].

In the past the responsibilities for all design and engineering studies was made for the State Road Design Institute. Recently this institution was divided into a number of small private design agencies with reduced staff number (lack of qualified specialists) and lower practical experience since last decade there were a little road design studies conducted in Moldova.

Contractors for road construction and road rehabilitation are totally or partially privatized. Partially privatized contractors have been transformed into joint-stock venues. Government owns 22% of stock of the country's biggest national road construction company. In other 3 construction companies, the Government owns more than 60% of stocks. The Government also owns 70-90% of stocks in 38 road maintenance contractors. There are also two road construction contractors 100% owned privately. Along with government expenditures for roads maintenance (about US $6,0 million per year), turnover figures of construction industry are low (about US $1,0 million for trunk-roads), although its capacity is reportedly 10 times as much as this amount. Looking for revenues, many contractors practice other construction activities, such house-building, tile production, etc. The present situation, when so little money was spent to maintain Moldovan roads, road construction industry can not develop properly. Many contractors complain about loss of their most skilled staff that leaves for neighboring countries[14].

Environment

The principal competent authority in the field of environmental protection and management is MENR. The State Ecological Inspectorate subordinated to MENR deals with environmental issues both at central and rayon level.

The competent EA authority in Moldova is the network of environmental agencies performing SEE. The network is formally subdivided into MENR itself and State Ecological Inspectorate that is subordinated agency of the MENR. Division on Environmental Pollution Prevention of MENR is responsible for checking and approval of full EIA studies. Headquarter of the State Ecological Inspectorate is situated in Chisinau. It includes Department of Ecological Expertise and Environmental Authorizations, which is directly responsible for SEE, and local ecological inspectorates for 32 raions, for Autonomous Territorial Unit (ATU) Gagauz Yeri, for municipalities Chisinau, Balti, Comrat, and Bender (which are also responsible for performing of SEE but in relation to projects that are of local importance and small-scale environmental impacts).

[13] Moldova: Transport Strategy Update with Emphasis on the Road Sector, December 2002, World Bank
[14] Moldova: Transport Strategy Update with Emphasis on the Road Sector, December 2002, World Bank

In the ministry SEE is performing by a group of permanently employed state experts working in the Division for Environmental Pollution Prevention; they may ask for additional support from the central office of the State Ecological Inspectorate or, if necessary, for revision of EA documents for complex and dangerous objects, as well as from any other resource experts and specialized institutes (for instance, Academy of Science, Moldovan State University, Technical University, state design institutes, etc.). By the MENR and State Ecological Inspectorate all aspects of the environmental media are being presented, *e.g.,* air, soil, flora and fauna, *etc*. These experts should be highly skilled professionals with at least 10 years of experience in the field and five years as planners.

At the same time there are no any environment departments or staff in charge within MTRI and State Road Administration. There is also lack of environmental specialists among permanent staff of the State Road Design Institute, which actually is in the process of reorganization towards several small private design companies.

4.2. Assessment of capacities to perform safeguards

While Moldova made impressive progress in developing legislation on environmental protection and EA, more effective environmental management requires progress in relation to: (i) promoting to apply the current Sectoral Environmental Assessments towards mitigation any serious unanticipated environmental consequences and incorporation of feasibility studies environmental findings into selection and design of sub-projects; (ii) development institutional capacity within MTRI for performing of the Strategic Environmental Assessment (SEA) for the whole sector development plans and application of the Environmental Impact Assessment (EIA) for newly constructed or heavily rehabilitated roads; and (iii) further strengthening of SRA and State Ecological Inspectorate capacities towards supervising of implementation of environmental monitoring plans (EMPs), (iv) increasing capacity of design institutes (including private ones) in relation to consideration of environmental concerns.

The actual institutional capacity of borrower was evaluated during project preparation stage. On the basis of this evaluation one can conclude, that MENR and SEE have relevant capacities to perform their duties concerning reviewing EA studies and enforcing EMP provisions.

As noted, at the national level EA policy development, review, and enforcement are charged by SEE via MENR and Ecological Inspectorate. MENR has a mandate to develop the regulatory framework for environmental assessment, as well as for the national environmental policy, planning regulation and coordinating of environmental matters with the line ministries. The actual intention of MENR is to introduce the Strategic Environmental Assessment (SEA) procedures to be incorporated into in-line ministries as a planning tool. MENR is actually finalizing preparation of Implementation Strategy of EECUN Protocol on SEA under Convention for EIA in the trasboundary context. As a general guideline the Introductive Resource Kit on SEA for Republic of Moldova had been prepared in 2006.

At the same time, within MTRI and project implementing agency (State Road Administration) there are no any special unit and/or especially designated staff responsible for environmental issues. Furthermore, in both institutions there are no subdivisions that work in this area, and also analytical laboratories that might ensure compliance with the existing legislation, regulations and ecological norms.

From the performed analysis evidently that at present the country does not have enough capacity to implement efficiently environmental safeguards. In this regard, the project would support capacity building in institutions responsible for EA, as well as with MTRI and SRA staff. First of all, it was proposed to provide MTRI and SRA with technical assistance for environment management and assessment, including training workshops, revision of environmental

guidelines in the road sector and provision of full-time environmental specialist to the SRA. Proposed capacity building activities are described in details under chapter Institutional Arrangements.

4.3. WB Safeguards procedures to be considered

WB has a series of safeguards policies and procedures that address different issues. WB safeguards policies that may be triggered by current project are the following: (a) Environmental Assessment (OP 4.01) and, probably (b) Natural Habitats (4.04). At current stage only policy related to the Environmental Assessment (OP 4.01) is considered to be applicable, however, as project implements, other policies may be potentially triggered, as well. It is strongly recommended that during feasibility studies these aspects had been clarified in more details.

Environment Assessment. World Bank requires environmental assessment (EA) of projects proposed for financing by Bank to ensure their environmental soundness and sustainability, and thus to improve decision making (OP 4.01, January 1999). EA is a process whose profundity and type of analysis depends on nature, scale, and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts; examines project alternatives; identifies ways of improving project selection, sitting, planning, design and implementation by prevention, minimization, mitigation or compensation of adverse environmental impacts and enhancing positive ones. It also includes mitigation and management of adverse environmental impacts during project implementation. The Bank prefers preventive measures rather than mitigation or compensatory ones, whenever feasible.

EA takes into consideration the natural (air, water, and land), social (human health and safety, and such social aspects as involuntary resettlement, indigenous peoples) and cultural environments, as well as transboundary and global environmental aspects. It also takes into account the variations in project and country conditions, findings of country environmental studies, national environmental action plans, the country's overall policy framework, national legislation, and institutional capabilities related to the environmental and social aspects, and obligations of the country to be met under relevant international environmental conventions and agreements. The Bank does not finance projects that would not comply with these obligations, if this identified during EA.

Information disclosure and Consultation. For (i) A and B projects and (ii) sub-projects categorized as A and B, the borrower consults project-affected groups and local non-governmental organizations (NGO's) about the project's environmental and social aspects and takes their views into account. The borrower initiates such consultations as early as possible. For Category A projects, the borrower consults these groups at least twice: (a) shortly after environmental screening and before the terms of reference for the EA are finalized; and (b) once a draft EA report is prepared. In addition, the borrower consults with such groups throughout project implementation as necessary to address EA-related issues that affect them. The Borrower provides relevant information in a timely manner prior to consultation and in a form and language accessible to the groups being consulted.

The Borrower makes the draft EA (for category A projects) or any separate EA report (for category B projects) available in country in a local language and at a public place accessible to project-affected groups and local NGOs prior to appraisal. The final EA report should be sent to the InfoShop prior to appraisal for all category A and category B projects. For category A projects, the task team sends a summary of the EA report to the Board of Directors as soon as it is received. Separate Resettlement Plans and Indigenous Peoples Plans are disclosed with the relevant EA report.

4.4. Assessment of adequacy of National EA requirements to the WB rules and procedures

The Republic of Moldova has a comprehensive set of environmental laws and regulations. Environmental provisions stipulated both by the Constitution, and such laws and Law on Environmental Protection (1993), Ecological Expertise and Environmental Impact Assessment (1996) and other sectoral laws on environmental pollution and natural resources management comply with World Bank environmental policies. A special analysis on compatibility of the Moldovan EA system with WB and EU rules and procedures was conducted by the WB in 2003[15]. The main conclusion of the study was that many features of the Moldovan EIA system are generally compatible with corresponding World Bank procedures and relevant EU directive. Furthermore, existing Moldovan legal framework often is even more comprehensive and detailed. However, there are some important deficiencies to be addressed:

- Formal provisions for Strategic Environmental Assessment require specific formal regulation (procedure);
- General and specific guidelines for SEA, EIA studies in major areas of national economy have to be developed (or World Bank guidelines, in the *Pollution Prevention and Abatement Handbook* to be assessed and applied);
- Screening and scoping phases should be legally built with clear criteria and procedures;
- Method of coordination with other planning studies, particularly SEA, has to be clarified;
- A third category of projects (those with no environmental impact) has to be officially established with clear criteria for assessment and simplified environmental requirements;
- Clear criteria for screening of projects have to be outlined;
- Scoping methods have to be established;
- Content of EIA report should be revised in order to incorporate policy; legal and administrative framework; non-technical summary; records of public hearings;
- Clarify responsibilities for carrying out of environmental monitoring and monitoring of performance after SEA and EIA findings;
- Responsibilities for enforcement and compliance have to be outlined in SEA and EIA Regulation and Law;
- Independent expertise for SEA and EIA reports quality should be envisaged and incorporated;
- Decision-making procedures and responsibilities should be clearly described.

[15] R.Klees, A. Barannic, A.Capcelea. EIA systems in Central and eastern European Countries, 2003, WB (see: www.Worldbank.org/eca/environment)

5. Environmental impacts

The purpose of this section is to identify possible environmental impacts resulting from planned development of the road sector in general (in relation to the Government's Road Sector Program) and proposed activities under Moldova Road Sector Program Support Project.

The nature and scale of impacts have been determined by the type of interventions within the proposed project to assist the road sector, which mostly focuses on improvements of existing roads through resurfacing, provision of drainage, and routine road maintenance. Therefore, the environmental impact analysis for three stages (expected under the Road Sector Program) was performed separately. These stages are next:

- Reconstruction of heavily damaged roads (not included in the Moldova Road Sector Program Support Project, but which may be considered later on),
- Improvement of existing roads under Moldova Road Sector Program Support Project (for the *Road Rehabilitation Component* as *Institutional Strengthening Component* it will have no direct negative environmental impacts), and
- Routine road maintenance.

Besides, more important aspects of potential (negative and positive) impacts at the stage of reconstructed/ improved roads operation (traffic) were evaluated.

Generally, no major project environmental impacts are expected. Most environmental impacts will be temporary and local, mostly during the construction phase and will cause only minor, localized and short-term negative effects. Most of them will be mainly linked with light rehabilitation works such as leveling, grading, potholes patching, cracks priming, surfacing, quarrying, use of hazardous materials, such as combustive-lubricating ones, bitumen, etc., traffic of construction vehicles/ hauling of road-building materials, building materials stockpiling and use of waste disposals. These impacts are common in road rehabilitation works and can be mitigated by existing management techniques.

Impacts originated from use of asphalt-concrete mixtures, bitumen and other hazardous materials, and their hauling from sites where they are produced to the sites where they are applied had been considered, as well. All these impacts are also common for such kind of works and can be easily mitigated through application of existing techniques and measures.

After completion, the project will have positive indirect impacts on human welfare, safety, health and socio-economic environment through reduced vehicles operating cost, decreased number of accidents; reduced air pollution resulted from vehicles emissions on rehabilitated road sections; cleaning up of roadside drains; reduced risk of soil pollution and erosion, and water pollution resulting from rehabilitation of drainage system, reduced risk of landslides due to slope stabilization, better access to settlements and markets, development of new business opportunities, etc.

Using as a reference the guidelines provided in World Bank's Handbook on the Roads and Environment a general list of potential impacts during construction/rehabilitation; operational and maintenance phases (see Annex 2) has been prepared that lists vide range of possible environmental and social impacts that could be anticipated from a project of this nature.

As shown in Annex 2, Table 1, outlined environmental and social Impacts for road rehabilitation phase, resurfacing of existing roads, that the project mostly would consist of, have a small number temporary local on-site environmental impacts. Significant disturbances to land, interference to soil stability and hydrology in the area will not take place. Impacts on air quality and noise levels will depend on the projected increase of traffic flow and anticipated reduction of

traffic congestion - both due to improved road conditions. Presumably, the net effect on air quality and noise levels will have a positive effect as the roads considered for rehabilitation are the national roads which are generally used permanently even in cases where the road conditions have deteriorated significantly and/or an alternative route with better conditions are available. Most of the negative environmental impacts triggered under this project will be seen off-site where road-building material would be sourced. If not managed properly, quarry and borrow sites can have substantial impacts on the surrounding environment as well as intrusion on the aesthetic quality of the sites. Considering this it was decided that the project will specify contract provisions governing the sources of constructional materials (e.g. asphalt, stone, sand, etc.) would be supplied only from sources with approved licenses, permits, and/or approvals for environment and worker safety. Contractors will be required to produce relevant licenses for quarries and borrow sites where constructional material will be excavated.

In addition to main impacts identified above, one should also consider temporary disturbances to the environment that might occur during the road rehabilitation phase. Waste water runoff from construction camps, spills of substances used in equipment/machinery operation and maintenance, traffic congestions caused by improperly planned detours and closures can cause localized impacts, which can be temporary quite significant and hence need to be carefully considered.

Annex 2, Table 2, outlined potential environment and socio-economic impacts during the road operation phase which are mostly linked with combustion gases emissions, contaminated surface run-off and at the same time, reduced vehicles operating costs and reduced emissions into air as compared to previous road conditions.

Annex 2, Table 3 reflects the environmental and social impacts during the road maintenance phase mostly linked with light road repair works.

These annexes identify in details road project implementation activities, potential positive and negative impacts caused by these activities and suggested measures to be taken towards impacts mitigation.

Relevant information from this section should be applied when specific environmental analysis is conducted (it is expected during feasibility study) to determine the type of impacts and extent of severity linked with further identified sub-projects.

6. Analysis of alternatives

The Sector Environmental Assessment considers potential alternatives generally linked with sector policy and priority of road resources for various regions and types/conditions of the roads.

There was not proposed construction of new roads, and hence, in-deep analysis and evaluation of alternatives is not required. Motor roads remain the most significant goods and passenger's transportation pattern in the country and play a vital part in development of Moldovan. In such a way, other types of transportations, e.g. railway, air or water will not be considering as an alternative to the motor one, traditionally developed in Moldova.

Proposed roads corridors were selected with consideration of their international, national, and local significance, actual and projected traffic flows and technical status of roadway covering. No more road corridors and road types/status (highway, country or heavily deteriorated roads) can be considered as an alternative at the time being.

The only strategic alternatives are "no rehabilitation and/or maintenance" or "rehabilitation and/or maintenance" approach.

The "no rehabilitation/ maintenance" (or "no project") alternative is not a good environmental option which being chosen may provoke adverse environmental effects/environmental risks over time. These risks may arise as a result of the following conditions:

- road's technical status (roadway covering, road basement, engendering enforcement structures, side and cut-off drains, etc.) will be progressively deteriorating;
- poorly controlled surface and groundwater flows may cause localized erosion, disturb drainage patterns and trigger landslides and ravines processes which in turn, can affect the nature and roads infrastructure itself;
- lack of sufficient maintenance (cracks and potholes on road surface) will affect road's safety and cause car accidents, humans death and injury, as well as accidental spills contributing to pollution of down land soil and waterways, etc.;
- poor roads will force drivers to apply lower speed under non-optimal engine regime that may result in increased emissions of combustion gases and additional pollution of air, soil and water, as well as bigger noise impact;
- progressive road's deterioration will also increase transportation time, discomfort to passengers, losses and damages to goods, more fuel consumption and other social and economic negative impacts;

The "rehabilitation and/ or maintenance" approach, proposed by the Moldova's Road Sector Program is a better environmental alternative, as most of impacts described in previous chapter are temporary, local, easily recovered and managed.

The feasibility study to be performed before sub-projects are finally selected, may suggest a range of specific options that have to be considered, including:
- location of sub-projects and related roads segments lengths;
- types of improvements for certain roads sectors;
- technical and engineering solutions;
- work schedule and modes of traffic regulations on the road sections under rehabilitation/ maintenance;
- environmental consideration, such as reduction of emissions into air, wild animals migration patterns, livestock movement, noise control measures, etc.
- selection of borrows pits and queries to provide local building materials (sand, gravel);

- identification of places for asphalt-bitumen plants operation, transportation and heating of bitumen;
- requirements and specification for road construction machines, equipment and techniques,
- others.

Analysis of aforesaid options is out of the scope for Sectoral Environmental Assessment, but specific environmental analysis of alternatives would be very important at the stage of feasibility study.

7. Environmental Management Plan

The current Environmental Management Plan (EMP) includes (i) national and sector level mitigation with outlined proposals for developing of policy/regulatory and institutional framework for EA as well as strengthen the EA capacity in all institutions involved, i.e., in government road sector, environmental agencies, among national contractors; (ii) EA management framework to be used for environmental assessment/screening of the proposed road sub-projects; (iii) Environmental Guidelines, (iv) and Environmental Monitoring Plan.

7.1. National and sector level mitigation

It was suggested that the project would support capacity building activities for MTRI and SRA staff, as well as for the institutions responsible for performing EA. First of all, it was proposed to provide MTRI and SRA with technical assistance for environmental management and assessment, including appointment of full-time environmental specialist, revision/adoption of environmentally oriented road design/construction requirements and training.

The environmental specialist within SRA is needed to assist in: (i) integrating environmental procedures into project cycle and into sectoral environmental policies and management; and, (ii) reviewing sub-projects that would require conducting of limited or full environmental assessment, (iii) coordination of preparation of environmental studies, EA reports, and relevant chapters of design documentation, (iv) coordinate all required environmental approvals and permits, both at the national and local levels, (v) check if bidding documentation and contractors' contracts include all required environmental considerations, (vi) prepare curriculum and supervise/implement training activities for SEE and local ecological inspectors on supervision of EMPs implementation, (vii) to carry out SRA monitoring of environmental impacts resulting from project activities, monitor correct application and efficiency of mitigation measures commissioned by contractors. Detailed requirements and scope of works for full-time environmental specialist are included in chapter on Implementing Arrangement. The environmental specialist may be trained through visiting of similar WB projects abroad in order to gain and improve relevant experience and skills.

It was also proposed that the project would support training for MENR, MTRI and SRA staff in the field of Strategic Environmental Assessment, organization of workshop that would contribute to relevant capacity, and preparation/publication of Strategic Environmental Assessment guidelines for road sector development. For this purposes resource experts or experienced NGO may be engaged. It was also discussed an issue that in case of Transport Sector Program for 2008-2017 which will include a Transport Sector Strategy and a prioritized 10-year Transport Investment and Expenditure Plan is prepared by the Government, the pilot Strategic Environmental Assessment can be conducted. It was also underlined that relevant funds can be found among donors.

It was proposed that the project may finance preparation of general Environmental Road Handbook mostly designated for road policy managers and public. The Environmental Road Handbook may incorporate national and WB policies, findings from relevant WB handbooks[16], other technical and policy guidelines and summarize international experience and Europeans standards in the field. The main purpose of this activity is to prepare guidelines which will be oriented to the environmental and road safety policy issues, and would include the framework for better environmental decisions and involvement of public rather than a technical engineering document. The guidelines may be prepared by private consultants or NGO.

[16] "Roads and the Environmental Handbook", WB Technical paper No 376

The Engineering Standards *(Temporary Construction Norms 9-79. Guide for environment and land tenure protection measures for reconstruction of automobile roads in Moldova, 1979; Construction Rules D.02.01-96. Road and bridges: Requirements for environmental protection during design, construction, rehabilitation, repairing and maintaining of roads and bridges, 1996,* and *Temporary Construction Norms 18-74. Instructions on architectural and landscape designing of roads, 1975)* can be appropriately improved in the light of policy guideline, mentioned in previous paragraph, and the new modern version in local language may be produced. At present, aforesaid Standards are available only in Russian. This activity may be implemented by engineering consultants or a specialized company.

Additionally, the project will support training activities for SEE and local ecological inspectors on supervision of EMPs implementation and on enforcement of their provisions. Environmental specialist, employed by SRA may implement this activity, with assistance from resource experts, if needed.

It is also important to produce environmentally oriented leaflets, booklets, placards, reflecting the major environmental findings obtained during project implementation and designated to provide information for public and NGOs community.

7.2. EA and Management Framework

The proposed Environmental Assessment and Management Framework (EAMF) covers: (a) procedures for environmental screening of sub-projects and criteria for categorization; (b) procedures for conducting Environmental Impacts Assessment and/ or preparing the EMP for selected sub-projects; and (c) roles and responsibilities for EIAs and/ or EMP reviewing, approval, monitoring and enforcement.

The current EAMF should serve as a template for performing of appropriate environmental analysis of sub-projects and if designed, for ensuring consistency with Moldova national environmental requirements and WB policy. The EAMF aims to ensure that: (a) the sub-project activities do not create or result in serious adverse impacts on local communities and environment, (b) the mitigation plan is implemented properly, and (c) possible complaints from local authorities and communities are minimized. The EAMF also covers institutional arrangements needed for evaluation and monitoring of environmental impacts during design, construction, operation and maintenance phases. The EAMF contains also recommendations concerning public consultations to be held for each selected road sub-project of category B and disclosure of EMP.

- **Procedures for environmental screening of sub-projects and criteria for categorization**

By the time being, details of specific sub-projects and roads sites are unknown and hence site-specific EAs cannot be conducted. Considering this, the Sectoral Environmental Assessment identifies generic issues that are typically associated with road rehabilitation and maintenance activities, as proposed under the Moldova Road Sector Program Support Project and may be expected under entire Moldova's Road Sector Program, and should be apply when relevant details are available. In such circumstances, OP 4.01 requires that arrangements be made whereby the project implementing institutions undertake the functions of sub-project screening, EA review and implementation of mitigation and monitoring plans.

Before design, the consulting companies that will be hired to conduct feasibility studies (for about 500 km of roads) should identify sub-projects and assess their alternatives. At this stage it is important to evaluate proposed sub-projects also from environmental perspective and define type of EA required and specific formal requirements.

During feasibility study it may become evidently that some of sub-projects (or parts of roads or supporting infrastructure) may require full detailed EIA study[17], some of them – only SEE of design documentations[18], or, for some of them, only environmental permits may be required.
Nevertheless each individual sub-projects (and relevant supporting infrastructure like deposits, asphalt-bitumen plants, constructional materials carriers if it is a case) will be assessed and, if necessary, engineering documentation will be reviewed and cleared by the State Ecological Expertise (SEE) as applicable (for category B projects), under prevailing national environmental legislation in Moldova and by IDA prior to the approval of disbursement of funds.

The sub-project environmental assessment will involve following steps[19]:

Step 1: Road sub-project screening
Step 2: *Preparing a simple EMP and/org EIA and EMP*
Step 3: Consultation
Step 4: Environmental Review and Approval
Step 5: Implementation
Step 6: Supervision and Reporting

Further the details for each step are elucidated.

Step 1: Road sub-project screening.

The screening process is not intended to interdict carrying out of roads rehabilitation and/ or maintenance-related works in environmentally and socially sensitive areas, but ensures that proper mitigation measures are proposed, included in design documentation and undertaken appropriately to avoid adverse impacts on affected population, natural environment and cultural heritage. Therefore, Initial Environmental Examination (IEE) for all sub-projects (or parts of roads or supporting infrastructures, if it is a case) has to be conducted by the SRA full-time environmental specialist in close cooperation with team/experts in charge for feasibility study. The findings of IEE will be analyzed and approved by the SEE authorities in order to have formal agreement (between SRA and SEE) on what kind of EA and procedures will be required further.

If IEE demonstrates that sub-project (or parts of roads or supporting infrastructures, if it is a case) is located in or near protected areas or other critical habitats or cultural heritage, it will require to establish close cooperation with Rayon Environmental Inspectorate or central SEE authorities and other concerned agencies (for example, health, geological, water or forest authorities) and consult to World Bank. This coordination is important to determine whether a full EIA needs to be conducted and/or design documentation would require passing of SEE formal procedures. Nevertheless the scope and contents of an IEE should be limited by follows:

- Brief description of the proposed project area and works;
- Description of relevant components of the existing environment, particularly those which caused that the area was classified as "environmentally and socially sensitive", if applicable;

[17] It is not expected now as no new road construction are foreseen, but MENR may classify the project activities as complex and harmful for environment and have a right to ask preparation of EIA, or, as example - the full EIA may be required for construction of asphalt-bitumen factories if stationary plants had to be build.
[18] Formally SEE is required for any deposits (which may be build for constructional materials as example), enterprises for constructional materials (ex. asphalt-bitumen factory) and construction of roads (heavily reconstruction potentially may be classified under this category)
[19] Depending on the nature of the subproject and readiness of the proposal, the steps 1, 2, and 3 may be combined into one single review and clearance step.

- Assessment of effects of the specific road works activity on relevant components of the existing environment already identified and described.
- Suggested practical mitigation measures towards lessen the specific potential effects identified;
- A short report of any public consultations carried out, including names and details of those consulted, any suggestions made, and how these were incorporated into the recommended mitigation measures;
- Recommendation on either specific mitigation measures have to be undertaken, including applicable ones from Annex 1, or if more comprehensive EA is required (EMP, EIA and EMP);
- Clear procedure steps for environment safety examination (SEE) and obtaining of relevant permits.

Typically the IEE would include the description of the key environmental features of the project site, whether critical natural habitats, forests, or rare and endangered species are likely to be impacted, whether water courses or groundwater sources will be affected, and wastes and contaminants likely to be generated during construction and operation, etc. In order to decide whether the proposed sub-project (or parts of roads or supporting infrastructures, if it is a case) may cause adverse environmental impacts that need to be addressed with more details in project design, it is proposed to perform an IEE to determine potential impacts and level of required environmental assessment.

In order assist IEE implementation a model of checklist has been developed and presented in the Annex 3. The checklist highlights typical issues that need to be considered and modus of identifying of all types of impacts that may arise from a project. It must be noted that each road project will have impacts that are specific for that road, and hence may emerge issues that are not covered by the checklist. Checklist should serve to summarize potential impacts and provide a simple and visual tool for conducting assessment. It also demonstrates magnitude and significance of the impacts. Completed checklist should help to make a decision on what type of further environmental consideration and procedures are important for specific sub-project (or parts of roads or supporting infrastructures, if it is a case). The coordination of its preparation with environmental authorities is essential.

Depending on nature and scale of the impacts, the reviewing authority (SRA environmental specialist after consultation with Rayon Environmental Inspections or central SEE authorities) will inform SRA about decision concerning further environmental documentation required for the sub-project.

Since the project focuses on road maintenance and rehabilitation, all physical works will be carried out within existing right-of-way width, and thus there will be no need for additional land acquisition and disturbance to property. Furthermore, expectedly there will be little or no impact on erosion, stability of slopes and sedimentation/siltation of water courses. Instead, the rehabilitation of the roads will decrease the erosion rate along the roads as compared to existing conditions. It is also expected that rehabilitation/maintenance works will not have any effects on water resources and water quality along the roads. The impact on natural vegetation associated with operating of quarry and borrow areas, and constructing detours and access roads to borrow material pits and quarry sites, probably will not be applicable within the project because only existing borrow/quarry sites will be used. Besides, there are no important wildlife and wildlife habitat in the proposed project areas, and project components will not involve any encroachment into known and designated ecologically sensitive areas, parks and nature reserves. Considering aforesaid, the screening process, in most of the cases, may display the following:

- *The sub-project is assessed by SRA environmental specialist as not having significant adverse environmental impact* ***(WB environmental category C).*** No specific environmental action is required. In dependence on scale of road activities, the design company has to elaborate a set of simple mitigation measures during the civil works to be carried out and which have to be describe in the contracts signed by road civil works Contractors. Most of these measures are very simple and based mostly on avoidance approach. They may be selected from the measures presented in the Annex 1 and simple EMP have to be prepared.
- *The sub-project is assessed by SRA environmental specialist as having adverse environmental impacts for which mitigation measures can be easily elaborated* ***(WB environmental category B and national requirements for formal SEE should be considered).*** For such projects EMP as a part of WB procedures and set of design documentation for national SEE (see chapter Policy, Legal and Regulatory framework for environmental and road sector) are required. The EMP should describe relevant environmental concerns and suggest mitigation and monitoring measures. In some cases, a limited additional environmental assessment study may be required before the EMP is complied. If SEE procedures are applicable (description of procedures and requirements can be found in sub-chapter National Requirements for Environmental Impact Assessment and Ecological Expertise) the SRA environmental specialist will consult with SEE authorities. If the impacts are significant and design documentation requires SEE formal approval, SRA seeks SEE and the Bank clearance before selection of sub-project (or parts of roads or supporting infrastructures, if it is a case). Consultation with affected population is expected during the planning and implementation phases.

The table below present typical sub-project screening criteria for categorization of Road Maintenance and Rehabilitation activities.

Project activity	**Objectives**	**WB project category**	**Environmental Protection Rules**
Minimum Maintenance	The minimum maintenance standard reflects the current practice in the absence of major maintenance works. These include the following : Patching: Repair of road covering by potholing, wide structural cracking and gravelling. It is carried out annually. Crack Sealing: This technique treats transverse thermal cracking and even wide structural cracking when area is limited. It is carried out annually. Routine Works: Routine works include all works that do not affect pavement performance. These works include shoulder repairs and various routine works such as vegetation control, road sign repairs and replacement, road striping, guardrail repair and replacement, etc. Routine works are carried out annually. Winter Maintenance: Winter maintenance includes all works carried out as part of winter maintenance such as salt spreading; snow removal, etc. An annual cost is specified for each road class. It	C	WB: Simple mitigation measures should be considered in the design and incorporated into the contracts for construction Contractors. Simplified EMP should be complied. National: The SEE is not required. For the activities, classified as rebuilding and reconditioning, the construction permit is not required if road improvement works are carried out within the Right of Way of such a road.

Project activity	Objectives	WB project category	Environmental Protection Rules
	applies to all roads.		
Surface Treatment (Single or Double)	To preserve the integrity of the pavement by sealing the carriageway in order to delay major intervention and renewal of the skid resistance.	C	
Surface Treatment With Shape Correction	To preserve the integrity of the pavement by sealing the carriageway in order to delay major intervention, improving roughness and renewal of the skid resistance.	C	
Resurfacing by Overlay	To renew surface characteristics including skid resistance, to improve roughness and to contribute towards the overall pavement strength. Overlay by surfacing included thickness between 30 and 50 mm and were applied over a roughness values varying from 3 to 5 IRI and low rutting level.	C	
Strengthening by Overlay	To strengthen pavements, which have reached or soon to reach the critical stage (poor or fair roughness condition), improve roughness and renew surface characteristics. Strengthening by overlay concerned the application of multi-layer overlays (two or three layers) varying from a thickness of 80 to 270 mm applied over a range of roughness values varying from 4 to 9 IRI.	C	
Strengthening by Mill and Replace	To strengthen pavements, which have reached or soon to reach the critical stage (poor or fair rutting condition), improve roughness and renew surface characteristics. It is achieved by removing the distressed top asphalt layer (s) and replacing it (them) with a new (or recycled) asphalt of similar thickness but with better structural characteristics. This standard was applied over a range of rutting varying from 10 to 35 mm.	C	
Strengthening by Reconstruction	To reconstruct pavements, which have reached the failure stage (poor roughness condition). Reconstruction is achieved through removal of the old pavement structure down to the subbase course and replacing it with a new (or recycled) pavement structure with high strength. Pavement structures varied according to road class and were applied over a range of roughness values carrying from 8 to 11 IRI	C	

Project activity	Objectives	WB project category	Environmental Protection Rules
Widening to 7 m	To increase the narrow roads to a minimum standard road width of 7 meters. This standard is applicable to Main roads with 6 meter or less width.	C	WB: An environmental impact assessment (EIA) and environmental management plan (EMP) are required and are to be cleared by national reviewing authorities and the WB National: The SEE is required if road improvement works are carried outside of the Right of Way limits of such a road and if the construction involves additional territories. The EIA is required for new roads. Construction permit is required if road improvement works exceed the right of way of such a road.
2 Lanes addition to Single Carriageways	To add two lanes to a single 2-lane carriageway (not dualisation) in order to increase capacity. This improvement standard is applied over a wide range of volume/capacity ratios varying from 0.5 to 1. It is mainly applied to Trunk and Main roads, which are not dual yet.	B	
1 Lane addition to Dual Carriageways	To add 1 lane to either sides of a dual two-lane carriageway in order to increase capacity. This improvement standard is applied over a wide range of volume/capacity ratios varying from 0.5 to 1. It is mainly applied to Motorways, Expressways, and Trunk Roads with Dual Carriageways.	C/B	
2 Lanes addition to Dual Carriageways	To add 2 lane to either sides of a dual two-lane carriageway in order to increase capacity. This improvement standard is applied over a wide range of volume/capacity ratios varying from 0.5 to 1. It is mainly applied to Motorways, Expressways, and Trunk Roads with Dual Carriageways.	B	
Reconstruct to Expressway Single Carriageway	To upgrade GP roads to Expressway single carriageway standard. This improvement standard is applied over a wide range of volume/capacity ratios varying from 0.5 to 1.	B	
Reconstruct to Expressway Dual Carriageway	To upgrade GP roads to Expressway dual carriageway standard. This improvement standard is applied over a wide range of volume/capacity ratios varying from 0.5 to 1.	B	

- **Procedures for conducting Environmental Impacts Assessment and/or preparing an EMP for selected sub-projects**

Step 2: Preparing a simple EMP or EIA plus EMP.

In case of **category C** of sub-project, in conformity with WB requirements, each sub-project (or parts of roads or supporting infrastructures, if it is a case) is required a simple EMP, containing basic mitigation measures for the roads rehabilitation and maintenance activities as well as monitoring and supervision measures. The main civil works will be limited by activities typically defined as routine and periodic maintenance (resurfacing and bridge small repairs; flood repairs or emergency maintenance; regular upkeep of safety features and road signs, etc.) and small rehabilitation works to strengthen the road, repair structural defects, restore the road to its initial condition, make small changes or improvements to alignment, and cleaning of drainage and

footpaths. If large-scale rehabilitation works are needed, SRA will inform the Bank before proceeding with the contract. The works will be carried out within the existing right of way and will not involve relocation and land acquisition. Should land acquisition and relocation is needed, the Bank will be informed, and the Resettlement and Compensation Guidelines (RCG) will be applied. For most sub-projects a simple EMP, complied by the SRA environmental specialist (see provisional example in the Annex 4), and environmental/monitoring requirements for design/construction contractors included in their contracts (see example in the Annex 5) will be sufficient to guide mitigation and monitoring.

In the case of **category B** of sub-project, the step 2 requires preparation of EIA[20] and EMP as stipulated in the WB policy documentation and will require formal conduction of national SEE of project design documentation (see sub-chapter National Requirements for Environmental Impact Assessment and Ecological Expertise). In those cases, when such documentation is required. The SRA will organize preparation of the relevant documents for submission during the time indicated by the reviewing authority, with considering of WB requirements and national SEE. Depending on environmental impacts resulting from project, the environmental documentation for WB could represent either a separate report, or simply be presented as a section in the overall project documentation submitted for appraisal to the approving authority (outline of EIA and EMP are presented in Annex 6). According to the national requirements it should be a chapter “Environment Protection” and sub-chapter “Environment Protection during Construction Phase” submitted as an integral part of engineering design documentation and other requested materials for the SEE (see sub-chapter National Requirements for Environmental Impact Assessment and Ecological Expertise). The SRA environmental specialist will be responsible for preparation of all documentation regarding WB requirements and should control whether in a contract to be signed with design/construction companies includes WB requirements and needs for preparation/ submission of all necessary documentation for SEE under national rules.

Step 3: Consultation.

For **category C** of sub-projects, the consultation to be held during preparation of IEE may be sufficient. The SRA environmental specialist will include a summary of local consultation in the checklist and will check whether findings of local environmental concerns are adequately presented in the design/ construction contracts and covered financially by the contractors.

For **category B** of sub-projects, the SRA will organize a hearing for consultation with and comments from project-affected groups and local non-governmental organizations during the environmental assessment process (at the scoping stage and at the time when draft EIA report is ready) and consider their opinions before making a decision on financing of proposed project. The SRA should provide relevant materials (process descriptions, maps, permits, building plans, etc.) to participants in a timely manner and in a form and language that are understandable to consulted groups. The SRA environmental specialist will be responsible for organizing of consultation, and also should provide the summary of initial consultation for design/construction contactors (this has to be included in the documentation for SEE reviewing and approval). If necessary, the additional consultation will be held by the SRA environmental specialist jointly with the contractor, specifically in regard to proposed mitigation measures and monitoring to be applied by the construction contractors. The SRA environmental specialist will be responsible for preparation of overall summary of consultation meetings in conformity with WB procedures.

- **Roles and responsibilities for EIAs and/or EMP reviewing, approval, monitoring and enforcement**

Step 4: Environmental Review and Approval.

[20] At this stage it is not expected that full EIA will be needed for sub-projects.

For **category C** of sub-projects, environmental review and approval will be responsibility of SRA environmental specialist. He/she should check whether design/ construction contracts include environmental items/clauses and whether design/ construction contractors fully use findings/ recommendations of IEE. To ensure that all environmental requirements are in place, the construction works can be proceeded only if SRA environmental specialist issues an approval document. Coordination with local governments, local environmental and health authorities is required.

For **category B,** the project documentation will be reviewed and approved by SEE and WB. The decision on environmental aspects of the project, and any additional measures or changes required to the proposed environmental management plan will be conveyed at this stage. WB will evaluate EIA and EMP prepared as outlined in the Annex 5. The SEE will specifically look for the implementation capacity and monitoring arrangements for the proposed mitigation measures and ensure that the costs of environmental management are considered in the project's cost. The SRA environmental specialist will control whether all documentation prepared by the Design Company and contractors is appropriately complied and relevant for SEE submission. The SRA environmental specialist is also responsible for presentation of required materials needed for WB reviewing and approval.

Step 5. Implementation.

For **category C** and **category B** of sub-projects, the SRA (on the base of the SRA environmental specialist conclusion) incorporate the environmental requirements into bidding/contract document for design/construction and ensures compliance of the contractors during the bidding process. The construction Contractors should appoint an officer dealing with environmental issues who will be responsible for implementation of mitigation measures, for holding of Contractor's monitoring plan, and for liaison with SRA (via SRA environmental specialist). This responsible officer should inform SRA and relevant environmental authority (rayon or national) prior to proceeding of construction works (at least 10 days before planned commencement of works) in order they would be prepared to make relevant inspections during the whole construction period. SRA supervising engineer and SRA environmental specialist will closely monitor the contractor performance and document this in the supervision/progress report. Useful recommendations towards increasing efficiency of the mitigation plan should be provided, as well. Progress reports to SRA provided by the Contractors, should contain relevant environmental information and should be evaluated by the SRA environmental specialist.

Step 6: Supervision and Reporting.

Once project implementation starts, the SRA environmental specialist, the SRA field engineer (technical supervisor), preferably jointly with representative of relevant environmental authority (who should be informed in advance), supervise the implementation of the mitigation measures for **category C** of sub-projects and application of EMP for **category B** of sub-projects through the course of construction and operation and specify corrective measures, as necessary. Annually SRA will provide World Bank with a summary of financed sub-projects and their environmental impacts in order to assess and prevent any cumulative effects of similar investments. The SRA will make all environmental assessments and environmental management plans prepared for financed sub-projects available to the World Bank project supervision missions. The SRA will periodically review the supervision report, periodically inspect the contractor performance, communicate to public, and prepare a semi-annual report to be submitted to the Bank. The overall responsibility for environmental supervision and reporting is a responsibility of the SRA environmental specialist

7.3. Environmental Guidelines

The proposed Guidelines define preventive and mitigation measures to be taken to prevent potential adverse impacts that might arise during the implementation of the road subprojects.

- **Guidelines for mitigation of environmental impacts during designing/ planning phase**

Design/planning phase: the adequate planning and design of environmental protection activities and mitigation measures will be required to minimize potential environmental impacts. Contract documents for design will incorporate all requirements to minimize effects on environment that may result from planned activities, as well as to avoid social and health impacts. For sub-projects which will require application of SEE, defined by national legal provisions, the preparation of necessary documentation for submission is essential. Thus all contractors will be required to use environmentally acceptable technical standards for design and comply with environmental, health and safety regulations stipulated by national legislation and World Bank requirements.

The associated costs and compliance of all procedures with SEE will be full responsibility of contractor for designing works.

Incorporation of mitigation measures in the design documentation will be monitored by the SRA supervision engineer, jointly with the SRA environmental specialist to ensure compliance with the contract.

- **Guidelines for mitigation of environmental impacts during construction/ rehabilitation and operation phases**

Construction/rehabilitation phase*:* construction/ rehabilitation mitigation measures will be required to minimize potential environmental impacts as well as any inconveniences to the public. To minimize potential construction-related negative environmental impacts, a combination of preventive actions and monitoring should be applied. Adverse construction activities will be reduced through the adoption of a set of mitigation activities, and adopted and applied to all sub-projects.

Contract documents for construction will incorporate all requirements to minimize disturbance from construction activities, including proper management of construction waste; control measures for waste fuel, oil and lubricants, other hazardous substances; provisions for protection of vegetation and fauna, including migratory species (if applicable), actions to reduce noise and dust levels; soil erosion control and water quality protection, and rehabilitation of areas under construction camp, asphalt-concrete plants and temporarily storage of building materials once the project is completed. The necessary mitigating measures would constitute integral part of the project implementation including the contracts binding the contractors to carry out the environmental obligations during road rehabilitation works. If contractors decided to include in their submitted proposals the construction of permanently or temporary supporting facilities (e.g. warehouses, asphalt-concrete plants, etc.) the costs for their design, mitigation and SEE procedures should be clearly presented, and this should be a full responsibility of contractors.

Thus, all contractors will be required to use environmentally acceptable technical standards and procedures during carrying out of works. Additionally, contract clauses shall include requirements towards compliance with all national construction, health protection, safeguard laws and rules as well as on environmental protection.

Furthermore, each contractor will identify officers responsible for implementation of on environmental protection activities in conformity with instructions received from the design engineer, SRA environmental specialist or relevant environmental protection agency/agencies. Financial penalties should be associated with compliance failure but with overall coverage by the contractors. Many mitigating measures should be included as separate items in the contracts' breakdown cost if it is a unit price contract. An identified extra fund will ensure that the

contractor having known that there is a budget for this and will clearly identify any extra costs associated with environmental measures.

Elucidating of all potential effects and mitigating measures should also be included in all training courses, or general guidelines prepared for contracts supervisors. Contract specifications concerning contractors' responsibilities during carrying out of civil works and taking mitigation measures should be reflected in engineering designs and bid documents for each sub-project. The EMPs should also specify contract provisions governing the sources of constructional materials and vehicles. Materials (e.g. asphalt, stone, sand, etc.) will be supplied only from sources with approved licenses, permits, and/or approvals to ensure environmental and workers safety, and any equipment to be used during construction should meet internationally recognized standards for environmental health and workers safety. The EMPs should also include provisions for spill prevention and cleanup in case of accidental spills, dust and noise control, and appropriate traffic management during construction, safety enhancement, construction sites cleanup and rehabilitation, etc. Further, the Bank will review the initial contracts for roads rehabilitation works in each sub-project to ensure that these clauses and measures are incorporated, as proposed.

To ensure that contractors understand the actions to be taken and the cost implications of environmental management, and that required actions and measures are priced in bid proposals, short-listed contractors will be informed about environmental protection requirements (for **category C** of sub-projects) and EMP (for **category B** of sub-projects) at the Pre-Bid Meetings. It is also proposed, that shortly after their appointment, contractors jointly with MTRI supervisors and SRA project personnel will attend a seminar on environmental management dedicated to environmental impact prevention/mitigation, explanation of EMP included in their contracts and provisions for environmental management monitoring to be carried out. The training seminar will be guided by the SRA environmental specialist. During construction the contractors' compliance with the provisions specified in the bid documents will be supervised by the SRA environmental specialist, SRA supervising engineer and State Ecological Inspectorate.

Some preventive and mitigation measures should be envisaged in all sub-projects. In particular, it relates to:

(a) construction contracts should comply with environmental, health and safety regulations stipulated by national legislation and WB procedures;
(b) contractors should follow a set of environmental guidelines for contractors prescribed by the EMP.
(c) contractors should be required to submit, as part of their bid, a site-specific environmental management plan including organization of training for participating staff. The scope of the plan and training requirements should depend on the scale of proposed activities.

To ensure compliance with the contract, implementation of mitigation measures will be monitored by the SRA supervision engineer, jointly with full-time SRA environmental specialist.

Operational phase: operational impacts will be addressed in order to avoid deterioration of road conditions and associated safety problems. Among major issues to be addressed during operation are: proper functioning of drainage facilities, landslide and erosion control. During this phase, the potential negative impacts will result also from civil works to be executed as part of the regular maintenance. To minimize potential operation-related negative environmental impacts, some preventive measures should be taken during the design phase, and then a combination of sound operational activities and monitoring should be carried out. This has to be a part of the bidding documents.

Maintenance phase: Safeguards measures for road maintenance shall be included in technical specifications for contractors. The guidelines form the basis of contractual obligations that are to

be fulfilled by road maintenance contractors. Contracts for maintenance will include specific clauses for environmental protection based on the guidelines. Supervision and monitoring of environmental performance will be carried out on the site by the SRA supervising engineer jointly with the SRA environmental specialist. Periodic audits will also be carried out during regular Bank supervision missions. The SRA will also prepare periodic (semi-annual) reports on adherence to environmental requirements under the project.

- **Guidelines for mitigation of social impacts during construction\rehabilitation and operation phases**

Mitigation measures must also address the human or social environment and respectively, social and socio-economic impacts resulting from road sub-projects implementation. One of the main objectives of socio-environmental impact assessment is to predict and prevent or mitigate unacceptable adverse social environmental effects on people from the proposed actions or projects. This is doing through involving the community and all other stakeholders, so that changes can be recommended at the planning, design and implementation stages.

Methodologies for public involving should be designed and implemented in a flexible manner adapting and responding to the local communities and conditions. They should be cost-effective so that they do not cripple the environmental assessment budget. That is why public involvement should initially be built into the project budget. Public involvement activities must be carried out in an open and transparent manner.

Public involvement is an essential element of environmental management of roads. It consists of three stages:

- information dissemination
- consultation, and
- stakeholder participation.

These stages of involvement can be applied at various times throughout the sub-project designing process, as well as the road project cycle, and may be used either once or simultaneously. It is necessary, therefore, to develop procedures and skills for informing the public and other interested parties about road development proposals. A catalytic role of local authorities will be getting people to participate in the various stages of the road project should be considered.

7.4. Environmental monitoring plan

This section contains suggested monitoring activities on implementation of the EMP prepared as an integral part of current Sectoral Environmental Assessment (for details see also chapter Implementing Arrangements). It includes the basic monitoring indicators, timeframe procedures and responsibilities for proposed monitoring activities. Cost for monitoring is not indicated as this was included in the operational expenditures of SRA and covered by budget envisaged for SRA environmental specialist.

Mitigation measures[21]	Monitoring indicators and procedures:					Cost	Responsibility
	What	Where	How	When	Why		
SRA environmental specialist:							
Hiring of environmental specialist	Qualification of candidates	SRA office	Revision of CVs, interviews	Submission of CVs			SRA

[21] defined by the current Sectoral Environmental Assessment

Mitigation measures[21]	Monitoring indicators and procedures:					Cost	Responsibility
	What	Where	How	When	Why		
	Scope of work	SRA office	Clarification of contract and TOR	Contract negotiation	To ensure that all requirements for environmental specialist are included and cleared		SRA
Training of:							
SRA environmental specialist	Training results	SRA office	Evaluation of training report	After training			SRA
MTRI, MENR and SRA staff	Prepared training materials, training results	SRA office	Evaluation of training report	After training			SRA, Environmental specialist
SEE staff	Prepared training materials, training results	SRA office	Evaluation of training report	After training			SRA, Environmental specialist
State Ecological Inspectorate	Prepared training materials, training results	SRA office	Evaluation of training report	After training			SRA, Environmental specialist
Contractors	Prepared training materials, training results	SRA office	Evaluation of training report	After training	To ensure that all contractors are aware about environmental considerations and understand requirements		SRA, Environmental specialist
Guidelines:							
Strategic Environmental Assessment Guideline	Scope of work, prepared materials	SRA office	Clarification of contract and TOR, supervision of work, evaluation of final product	According established time-schedule	To ensure that contractors understand requirements		SRA, Environmental specialist
National Environmental Road Handbook	Scope of work, prepared materials	SRA office	Clarification of contract and TOR, supervision of work, evaluation of final product	According established time-schedule	To ensure that contractors understand requirements		SRA, Environmental specialist
National Environmental Engineering Standards	Scope of work, prepared materials	SRA office	Clarification of contract and TOR, supervision of work, evaluation of final product	According established time-schedule	To ensure that contractors understand requirements		SRA, Environmental specialist
Public awareness:							
Leaflets, booklets, wall papers	Scope of work, prepared materials, dissemination	SRA office	Clarification of contract and TOR, supervision of work, evaluation of final product	According established time-schedule	To ensure that contractors understand requirements		SRA, Environmental specialist

In addition to the monitoring of mitigation measures shown in the table above, the monitoring of environmental indicators and mitigation measures performance will be a part of the overall project monitoring. The SRA environmental specialist will review the environmental status of the sub-project areas to assist with the establishment of a baseline for the major environmental parameters and set up a monitoring program for periodic review of the sub-project's impact on environment. Monitoring of implementation of environmental mitigation measures in road rehabilitation sub-projects, established within specific EMPs, will be the responsibility of:

- construction Contractors;
- SRA environmental specialist (with assistance from SRA supervising engineer), and
- Rayon ecological inspectors.

The findings of the relevant monitoring activities will be reflected in quarterly and annual progress reports. The progress reports will cover the implementation of proposed by EMP, activities, as well as extent of environmental impacts (if any). The site supervisors should be trained to be able to inspect construction sites, borrowing and dumping areas, and other potentially affected areas. Specific aspects to be monitored include:

- Carrying out of monitoring during construction;
- Monitoring of significant impacts during the operation of roads.

Monitoring indicators shall be developed for both the construction and operation phases of each road sub-project. Monitoring of construction activities will have to ensure that mitigation measures of construction impacts are being implemented properly, while the monitoring of operation is to ensure that no unforeseen negative impacts are arising. Periodic monitoring of roads will be conducted by SRA environmental specialist to ensure compliance with submitted monitoring plan. The functions of SRA environmental specialist be to: (i) review and approve environmental management plans (EMP) of roads to be funded under the program; (ii) monitor compliance with EMP by the various players involved in the implementation of the project; and (iii) collect data to document that the environmental and social procedures are being met.

Furthermore, monitoring and evaluation of sub-projects will be conducted by a local or international consultant during the mid-term review and at the end of the project.

SRA will supervise and monitor the overall activities and prepare a semi-annual report on the application of environmental guidelines and other frameworks and action plans during the planning, design and construction phase of the project. SRA with assistance from SRA environmental specialist will also develop the reporting requirements and procedures to ensure compliance of the contractors, conduct public consultation and implement public awareness programs, and hold periodic training for field engineers and contractors, as appropriate.

A detailed monitoring program designed to validate the effectiveness of the mitigating measures shall to be included in the EMPs for individual sub-projects. It should contain detailed environmental compliance-monitoring requirements, including parameters and indicators for all activities relating to the recommended mitigation measures. Implementation of the monitoring program will be the responsibility of the SRA, in collaboration with the State Ecological Inspectorate and its local offices and will be supervised by the MTRI nominated officer. Their terms of reference would require them to report on compliance with the provisions of the EMP through the regular progress reports that they are required to submit to the MTRI and the Bank.

8. Public consultation

While preparing current Sectoral Environmental Assessment in January 2007 there were consulted stakeholders from MTRI, SRA, MENR, SEE division within the State Ecological Inspectorate, State Road Design Institute, private design companies and Institute of Ecology and Geography of Academy of Science. The consultations were held in order to clarify project intervention to the environment, potential associated impacts, and national environmental assessment and approval procedures.

The short version (draft summary) of Sectoral Environmental Assessment had been posted on the website of Regional Environmental Center (www.rec.md) and had been distributed by REC and SRA among NGOs, interested audience and governmental officials.

The final version of the SEA summary had been posted for comments on the REC web site on February 27, 2007 and is available for the broad public in Moldova.

9. Implementing Arrangements and Budget

9.1. Implementing arrangements

The project will be implemented under the general supervision and responsibility of the Ministry of Transport and Road Industry. MTRI will execute the project through the *State Road Administration* (SRA*)* as the direct implementing agency.

A Steering Committee has been established by the Prime Minister to ensure broad Government oversight and guidance for the Government entire Road Sector Program, including those activities funded by donors. The Steering Committee of four members is headed by the Deputy Prime Minister and includes the Ministers of Transport, Finance and Economy.

State Road Administration. Direct responsibility for implementation of the Project would rest with the SRA. Its responsibilities would include: procurement, financial management, contract management, project and program monitoring and evaluation, and reporting. To strengthen SRA's capacity accomplish these functions, at least five local specialists have to be recruited under consultant contracts, through a competitive selection process. These will be in the areas of procurement, financial management, environment and contract management. They would work with regular SRA staff to transfer skills, organize activities, and generally increase the efficiency of the agency. In addition, an international Management Consultant will be recruited to provide general technical assistance and support to the Government overall Road Sector Program, for entire duration of the Project. Among his responsibilities will be to assist with the overall implementation of the Project and the Program, ensuring compliance with procurement rules and procedures, contributing to knowledge transfer, ensuring harmonization between donor- and the Government-funded activities, and generally providing technical and strategic advice to MTRI. A Bid Evaluation Committee will be established to carry out the selection of contractors, consultants and suppliers in conformity with agreed procurement rules and procedures. The Committee would be mostly represented by technical specialists from the Road Sector (MTRI and SRA), but would also include representatives from other ministries/ organizations, such as the Ministry of Finance and the National Procurement Organization.

Environmental specialist. In order to increase SRA capacities in the field of environmental management a full-time environmental specialist will be recruited to oversee the environmental aspects of project development and implementation. The primary tasks of the environmental specialist will be:

A. Identification of required types for Environmental Assessments:

- Conducting the Initial Environmental Assessments in order to identify the potential impacts and types of Environmental Assessment required for selected road sub-projects;
- Identification of road sub-project's environmental category and specification of details for environmental assessments. Coordinate the findings of Initial Environmental Assessments and project environmental categorization with SEE with respective divisions of MENR and clarification of needs for preparation of Environmental Impact Assessment report or simple Environmental Management Plan or documentation for formal State Ecological Expertise;

B. Environmental Impact Assessment report or Environmental Management Plan or documentation for formal State Ecological Expertise:

- To ensure that required environmental documentation (Environmental Impact Assessment report or Environmental Management Plan or documentation for formal State Ecological Expertise) for each selected sub-project (or parts of roads) for rehabilitation is prepared. This documentation should be prepared and adopted in conformity with national requirements before the construction works commence. The Environmental Management Plan should reflect potential negative impacts associated with planned works and include

proposals for mitigation measures to be taken, as well as monitoring activities related to potential impacts and mitigation measures;

- To ensure that implementation of mitigation measures and carrying out of monitoring are included in the financial plan for road sub-projects;
- To ensure that Environmental Impact Assessment report or Environmental Management Plan or documentation for formal State Ecological Expertise are presented for SEE in conformity with national requirements.

C. Integration of environmental requirements in contracts issued for carrying out of rehabilitation works:

- To present at the pre-qualification meetings of contractors the full set of environmental requirements to be followed by the contractors with use of general framework for sub-project evaluation and management;
- To exam contractors proposals (in the light of environmental protection requirements) and identify the gaps not covered by the proposed measures or budget;
- To prepare the environmental clauses which will be included in the contractor's contracts for implementation of road sub-projects;
- To ensure that sub-contracts proposed by the contractors are prepared for agencies which provide goods and services (particularly, for those providing and producing constructional materials – borrow materials, asphalt plants etc.) and have respective valid licenses and environmental permits in conformity with national environmental requirements.

D. Institutional Capacity Building, including improvement of environmental regulations in the road sector:

- To prepare the program (curricula) and organize training for: (a) integration of environmental requirements and procedures in project cycle and in sectoral policy; (b) performing of SEE of the documentation for road construction/ rehabilitation projects; (c) implementation of the state control and department's supervision over projects in the road sector;
- To organize pilot study and training on application of Strategic Environmental Assessments in the National Program for construction/ reconstruction and rehabilitation of roads in the Republic of Moldova;
- To organize revision and improvement of environmentally oriented regulatory acts, instructions and standards in relation to the road sector, including Requirements for Environment Protection during the design, construction, rehabilitation, repairing period and maintenance of roads and bridges;
- To organize publishing of materials on environmental matters in the road sector for specialists and for general public;
- To prepare TOR and organize selection process for experts, private companies, state institutes or NGOs to ensure implementation of required actions in the frameworks of Environmental Management Plan (included in current Sectoral Environmental Assessment report) in relation to institutional capacity building and training;
- To organize undertaking of measures for improvement of documentation ensuring incorporation of environmental protection requirements into program or projects on construction/ rehabilitation of roads.

E*. Supervision and monitoring:*

- To control and ensure that public participates in discussion on EMP reports for selected sub-projects;
- To supervise independently or jointly with the State Ecological Inspectorate the mitigation and environmental protection measures stipulated in Environmental Management Plan for each sub-project selected for rehabilitation of roads;
- To ensure implementation of the monitoring plan of sub-projects as well as establishing of baseline for sub-projects and efficiency of mitigation measures.

F. Reporting:

- To prepare semi-annual reports on the progress of implementation of measures proposed by the Environmental Management Plan;
- To prepare semi-annual reports on the environmental impacts originated during implementation of sub-projects and efficiency of mitigation measures applied to minimize negative consequences;
- To prepare outline and requirements for contractors reports related to the implementation of mitigation and environmental protection measures and to analyze completed reports;
- To present the effects of mitigation and environmental protection measures applied for overall public by specific publication or/and by annual seminars.

The Environmental Specialist implementing the TOR's requirements should consider national environmental legislation and regulations, in particular: (a) Law on Environmental Expertise and Environment Impact Assessment (1996); (b) Instruction on Order of Organization and Conduction of the State Ecological Expertise (2003); (c) Law on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (2000); (d) Regulation on access of public for environmental decisions (2001); (d) Requirements of environmental protection during the design, construction, rehabilitation, repairing period and maintains of the roads and bridges (1996), as well as other environmental policy and guidance of the World Bank, EBRD and IDA.

The Environmental Specialist must have an advanced degree in Environmental Science or related field, should have at least seven years working experience related to environmental management, designing and engineering projects (preferably in the road sector). He/ he should be familiar with procedures for environmental assessments and monitoring, road construction, maintenance and operational environmental management issues, national and international environmental standards and requirements for road management, and should have significant experience in working on environmental issues and coordination of public consultations in the Republic of Moldova. The Environmental Specialist should have demonstrated proficiency in English, Romanian and/or Russian and should be computer literate and familiar with all relevant packages.

Training. A training program to develop and improve professional skills and capacity in environmental management issues for the staff involved in project implementation will be organized under the project. The development of training program is under overall responsibility of SRA. For this purpose the SRA environmental specialist will be specially appointed for curricula development and organization of training. The overall training program is drafted as follows:

A. Training for SRA environmental specialist

The training is intended to increase capacity of hired environmental specialist in such fields as impact identification, mitigation measures elaboration, and preparation of environmental clauses for Contractors, monitoring and reporting. It is expected that SRA environmental specialist may visit similar WB projects abroad to gain relevant experience and skill. The duration of training is up to 2 weeks.

B. Training for MTRI, MENR and SRA staff

The training is intended for integration of environmental requirements and procedures into the project cycle and in sectoral policy. Training can be organized as two separate training sessions: first one - for integration of environmental requirements into the project cycle (first year of project operation), and second one - for presentation of Strategic Environmental Assessments of the National Program (Strategy) for construction/ reconstruction and rehabilitation of roads in Republic of Moldova (at the time when Program and Strategy are drafted). Both sessions will be held as one day workshop. Up to 25 participants are expected to

be trained. They could represent senior/middle staff of MTRI, MENR, SRA, road design and planning institutes, NGOs. To conduct training sessions, a resource experts or experienced NGO should be hired.

As a background paper for the first session the current Sectoral Environmental Assessment can be used as it contains all necessary information and EMP to be presented for participants.

The second session may be held by different way. First option – is to provide participants with information on needs and objectives of Strategic Environmental Assessments, their application in the road sector, to explain relevant procedures and methodology (theoretical training). The second option – first to conduct a pilot Strategic Environmental Assessment for the National Program (Strategy) for construction/ reconstruction and rehabilitation of roads in Republic of Moldova (additional funds should be found) and present both - theoretical background and prepared Strategic Environmental Assessment report.

C. Training for SEE staff

The training is intended for improving of performance of the State Ecological Expertise of the documentation for road construction/rehabilitation projects.

Training can be organized as a half-day training session (first year of project operation) for SEE staff on national and local levels (MENR, State Ecological Inspectorate, Rayon Ecologic Inspections situated within the project area). Up to 25 participants are expected to be trained.

To hold training, a resource expert or experienced NGO may be hired.

The major findings of the current Strategic Environmental Assessment can be used as a background paper showing procedures for screening and scoping phase, identification of significant impacts, development of mitigation and monitoring requirements.

D. Training for State Ecological Inspectorate

The training is intended to strengthen the state control and department's supervision of sub-projects implementation in the road sector.

Training can be organized as a set of one day regional training sessions (second year of project operation) for rayon environmental inspectorates placed within the project area. At least 3 training sessions should be organized and up to 15 participants are expected to be trained as per region (north, south, and west).

The SRA environmental specialist will hold the training focusing on the monitoring/supervision/inspection issues for different sub-projects.

The major findings obtained from the screening stage and preparation of simple EMP (for category C of sub-projects) and EIA and EMP (for category B of sub-projects) should be presented, and relevant monitoring requirements should be discussed.

E. Training for construction Contractors

The training is intended to improve capacities of Contractors to implement mitigation, monitoring and comply with WB and national environmental requirements during their works.

Training may be organized during second year of project operation as a two days training session for hired construction Contractors. Potential attendees of this training are senior managers, designated field engineers for environment, senior engineers, field engineers and labor brigadiers. Up to 15 participants are expected to be trained (for three construction contracts).

The SRA environmental specialist will hold the training focusing on EMP findings (mitigation and monitoring), environmental items/clauses for contracts, routine supervision of environmental conditions, reporting.

Revision of guidelines. Revision of environmental guidelines in the road sector is important long-term investment. Due to the fact that actually there are no adequately prepared national relevant guidelines (some of engineering standards are available only in Russian, lack of policy and planning oriented handbooks), revision of several guidelines by SRA is recommended. The SRA environmental specialist will be responsible for setting up requirements for contractors and evaluation of outputs.

A. Strategic Environmental Assessment Guideline
It is proposed that the project would support preparation/ publication of Strategic Environmental Assessment guideline for road sector development (up to 50 pages). For this purposes resource experts or experienced NGO may be engaged. The guideline should reflect objectives, advantages, procedures and methodology for assessment of policy, programs, and plans in the road sector. The guideline may be used as a background paper for holding of training envisaged under point **A. Training for MTRI, MENR and SRA staff.** If results of pilot Strategic Environmental Assessment are available they may be easily incorporated into training curricula as a practical example of implementation.

B. National Environmental Road Handbook
It is proposed that the project may finance preparation of the general Environmental Road Handbook mostly designated for road policy managers and general public. The Environmental Road Handbook may incorporates WB policies, findings from relevant WB handbooks[22], other technical and policy guidelines and summarize other international experience and Europeans standards in this field. The main purpose is to prepare a guideline (up to 200 pages) which will be more oriented to environmental and road safety policy issues will include the framework for better environmental decisions and involvement of public rather than poor technical engineering document. This activity may be carried out by private consultants or NGO.

C. National Environmental Engineering Standards
The Engineering Standards *(*e.g., *Temporary Construction Norms 9-79. Guide for environment and land tenure protection measures for reconstruction of automobile roads in Moldova, 1979; Construction Rules D.02.01-96. Road and bridges: Requirements for environmental protection during design, construction, rehabilitation, repairing and maintaining of roads and bridges, 1996; Temporary Construction Norms 18-74 Instructions on architectural and landscape designing of roads, 1975)* can be appropriately upgraded in the light of policy guideline, and a modern version in local language may be produced. This activity may be carried out by engineering consultants or company.

Public awareness. The project will produce several environmentally oriented leaflets, booklets and placards, reflecting major environmental findings obtained during the project implementation and designated to provide information for public and NGOs community. The expected number of copies is around 500. The publication lies under overall responsibility of SRA, and SRA environmental specialist will provide inputs for setting up the tasks and evaluation of results. Activity may be implemented by the experienced NGO.

9.2. Budget

Proposed tentative budget covers implementation of environmental management plan developed within the current Sectoral Environmental Assessment.

[22] "Roads and the Environmental Handbook", WB Technical paper No 376

The SRA will be responsible for implementation of EMP and should estimated costs in more details. A tentative breakdown of budgetary requirements (in $US) is shown below.

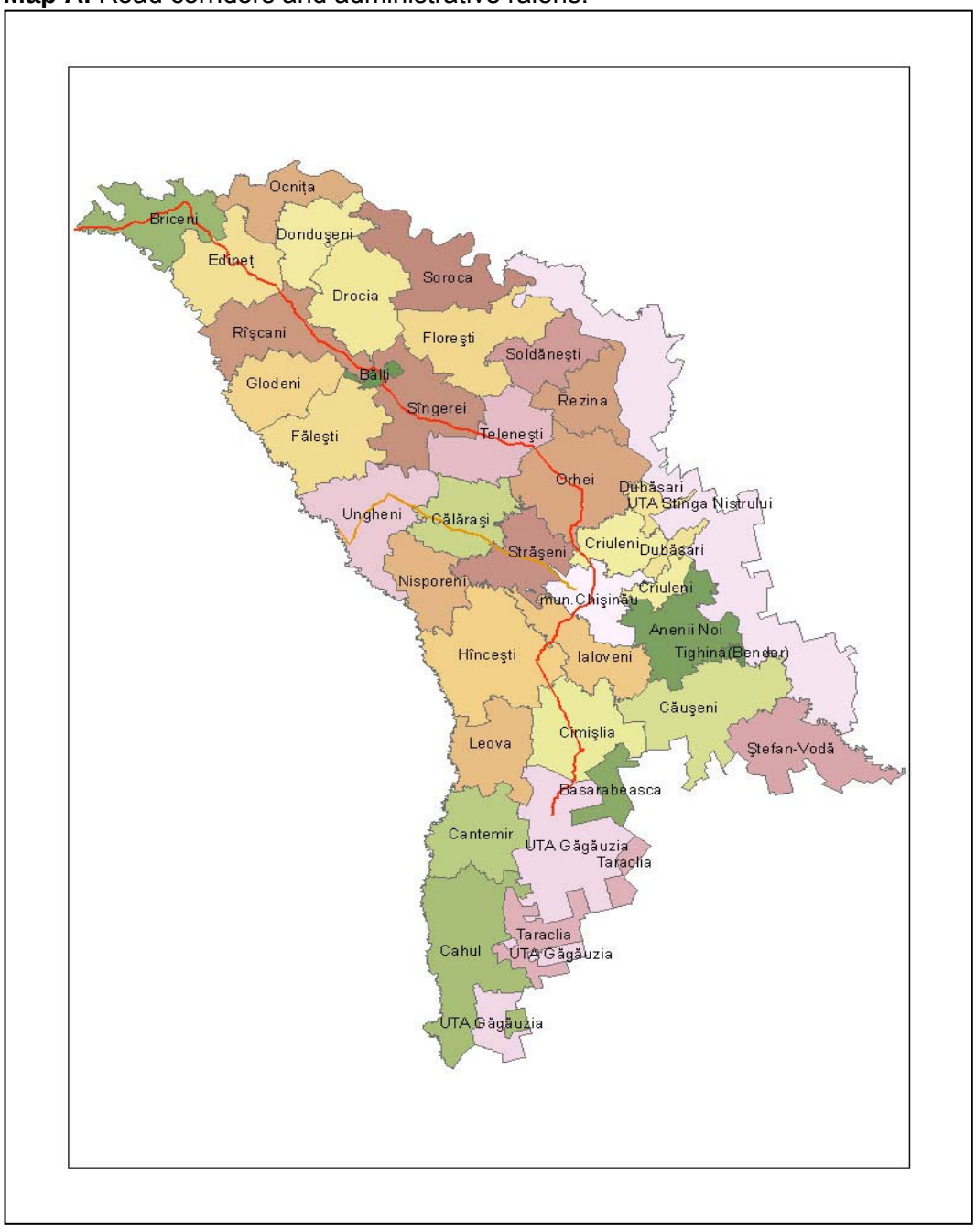
Line	Item	Yr.1	Yr.2	Yr.3	Total	Comments
SRA environmental specialist	Salary, travels to sub-project sites, monitoring and inspection, liaison with environmental authorities, coordination of training and other environmental works	tbd	tbd	tbd		To be defined by SRA as regular salary for an environmental specialist
Training	SRA environmental specialist	4000			4000	
	MTRI, MENR, SRA staff	3000	4000		7000	
	SEE staff	3000			3000	
	State Ecological Inspectorate		3 x 2500		7500	3 regional trainings
	Contractors		2500		2500	
Guidelines	Strategic Environmental Assessment		18000		18000	
	National Environmental Road Handbook			29000	29000	
	National Environmental Engineering Standards		13000		13000	
Public awareness	Leaflets, booklets, placards	2000	2000	2000	6000	
Sub-total		**12000**	**47000**	**31000**	**90000**	**Covers training, guidelines and public awareness**
Additional field studies	During sub-project screening	2000	2000		4000	The needs for additional field studies may be raised during sub-project screening. The cost can not be carefully predicted. It is recommended maintaining a certain financial reserve.
EIA and EMP preparation	Implication of resource expertise	5000	5000		10000	The needs for additional specific expertise for EIA/EMP preparation may be raised. The cost can not be carefully predicted. It is recommended maintaining a certain financial reserve.
Monitoring of mitigation measures during construction phase	Implication of resource expertise	2000	2000	2000	6000	The needs for additional specific expertise during inspection/monitoring of EMP requirements may be raised. The cost can not be

Line	Item	Yr.1	Yr.2	Yr.3	Total	Comments
						carefully predicted. It is recommended maintaining a certain financial reserve.
Sub-total		**9000**	**9000**	**2000**	**20000**	**Covers potential requirements for studies, EMP and resource expertise**
TOTAL		**21000**	**56000**	**33000**	**110000**	Salary for environmental specialist and required operational expenditures are not included

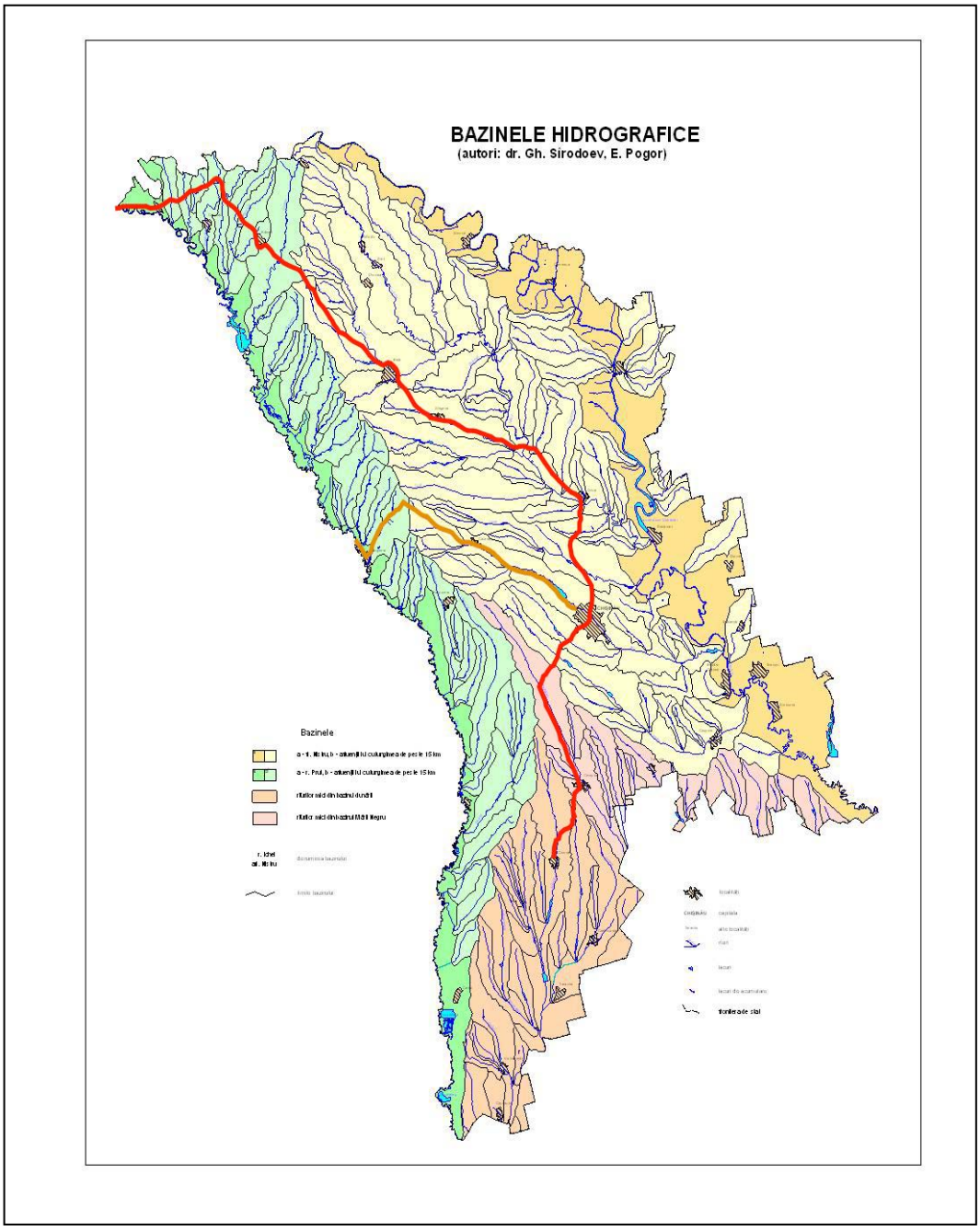
Annexes

Annex 1. Selected maps of baseline conditions

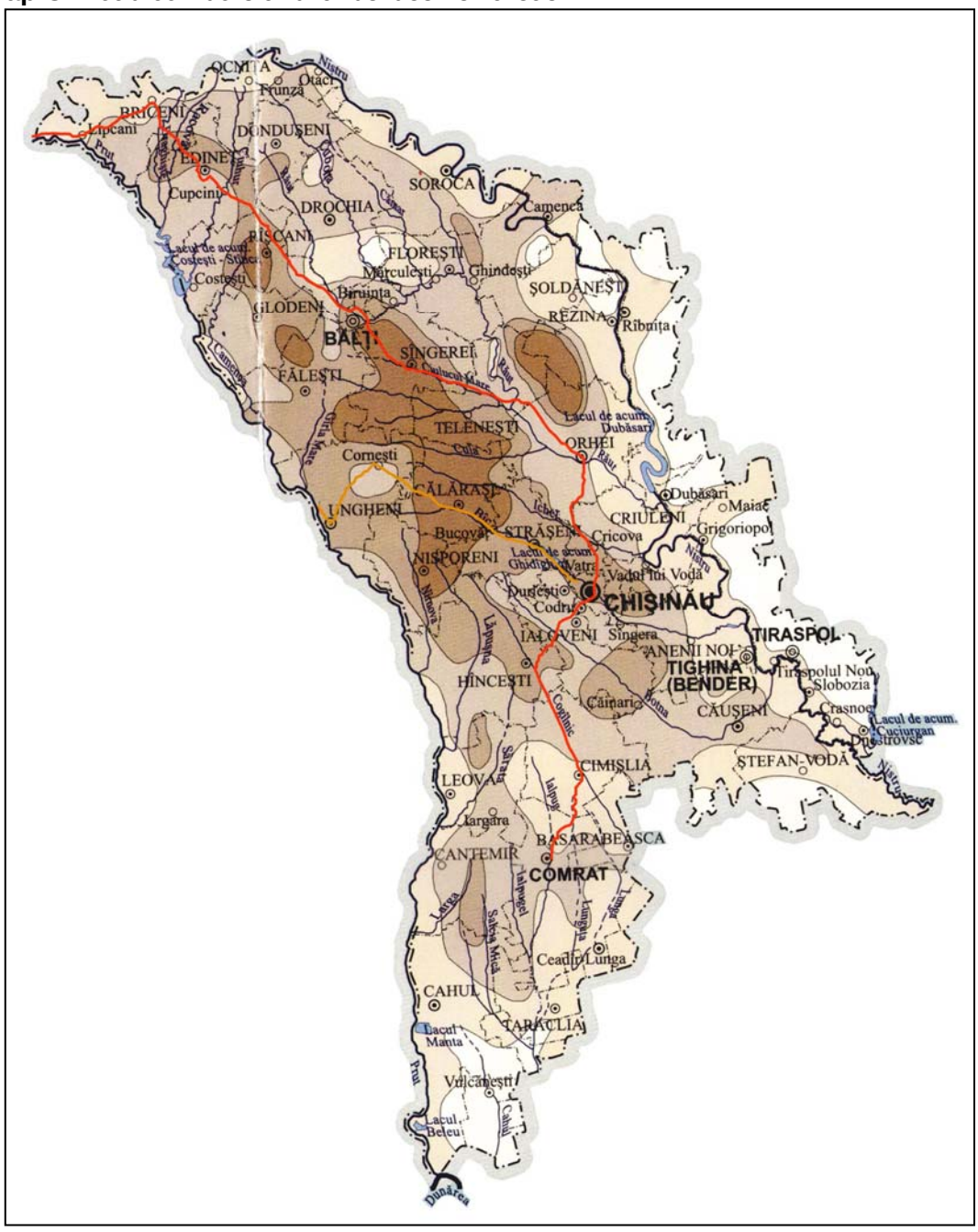
Map A. Road corridors and administrative raions.



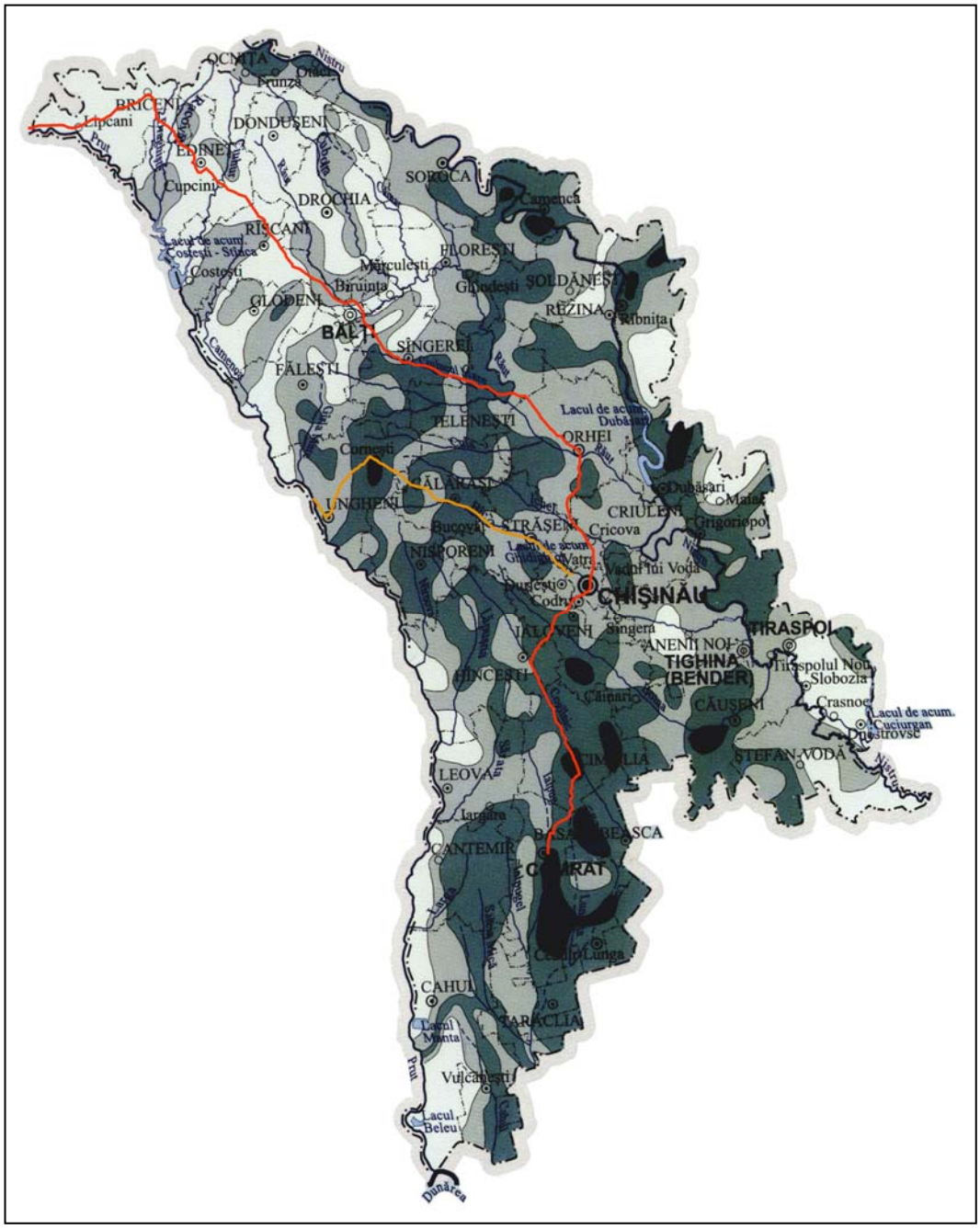
Map B. Road corridors and hydrological network



Map C. Road corridors and landslides risk areas



Map D. Road corridors and ravines risk areas



Annex 2. Environmental Impacts

Table 1. Environmental and Social Impacts for Road Rehabilitation Phase

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures

Soils and land	• Transportation, siting and operation of mobile asphalt plant/ or operation of statutory asphalt plant
	• Construction works linked with asphalt plant siting (construction of seat/ temporary haul roads, etc.)
	• Grading
	• Leveling
	• Potholes patching/ cracks priming
	• Pavement / Carriageway surfacing (laying of asphalt-concrete mixtures, laying cement-concrete slabs, etc.)
	• Use of hazardous materials, such as combustive-lubricating ones, bitumen, etc./ heating and spraying of bitumen
	• Heavy machinery and equipment operation
	• Traffic of construction vehicles
	• Hauling of constructional materials such as bitumen, borrow materials, asphalt-concrete mixtures, concrete, cement-concrete slabs, gravel, etc.)
	• Rehabilitation of road drainage system (drainage
		Negative:
		• Damage to land due to:
		  • land reclamation for siting of mobile asphalt plant, if needed/ reduced land use options
		  • site preparation works/ earthworks
		  • excavation of constructional materials
		  • haul roads
		• Damage to soil structure due to traffic of vehicles and storage of constructional materials (cement-concrete slabs, gravel, et.) in the immediate vicinity of road rehabilitation works
		• Accident soil pollution by petroleum hydrocarbons and other hazardous and toxic materials in the area of mobile asphalt plant operation
		• Land damage/ soil pollution by bitumen, asphalt concrete mixtures during loading-unloading/ transportation and laying
		• Soil pollution due to leaks of lubricants
		• Temporary uncontrolled surface run-off due to construction / rehabilitation of drainage channels
		• Soil pollution by components of combustion gases emitted by construction vehicles (esp. heavy metals)
		• Soil contamination due to constructional materials/ construction wastes disposals
		• Soil pollution due to contaminated surface runoff from the road under rehabilitation
		• Soil erosion caused by re-channelization of waterways
		• Formation of gullies along drainage channels
		• Soil contamination due to improperly arranged temporary accommodation facilitates
			Temporary/ local	• To plan carefully construction works to minimize land affected and ensure soil pollution prevention
				• To minimize construction site's size/ to minimize land affected/ to ensure soil pollution prevention
				• To select proper site for placing of mobile asphalt plant, if appropriate to minimize impact on land/soil
				• To ensure accuracy of road rehabilitation works/ to avoid spills, leaks, etc.
				• To provide proper haul roads to minimize impact on the land
				• To avoid loss of vegetation along the roads
				• To rehabilitate borrow areas, quarries and temporary haul /access roads by planting grass and trees and other measures
				• Proper design and installation drainage and retaining structures/ civil engineering structures/ clean up drainage channels/ culverts to minimize the risk of erosion and landslides on downlands
				• To avoid road rehabilitation works during heavy rains/ to mitigate velocity and volume of polluted surface run-off
				• Carry out landslides prevention activities/ physical stabilization of slopes (retaining walls, piles, etc.), if needed
				• To provide proper construction waste disposals

	channels, chutes, etc.) • Quarrying • Constructional materials stockpiling • Construction waste disposals • Construction/ rehabilitation of sidewalks in settlements • Establishment of construction camp/ accommodation facilities (sewage facilities, waste disposals, etc.)	**Positive:** • Slopes stabilization towards landslides prevention/ reduced risk of landslides • Decreased risk of soil pollution, soil erosion and landslides resulting from rehabilitation of drainage system • Decreased risk of land degradation potentials/ gullies formation	Permanent/ local	• To provide proper stockpiling of constructional materials • Planting / re-habilitation of vegetation (buffer strips) along the roads to minimize spreading of combustion gases/ particulates/ dust, if appropriate • Backfilling and restoration of eroded channels to natural conditions/ re-vegetation, if appropriate • Organize properly temporary sewage facilities • Clean up of the work site/ restoration of damaged areas after rehabilitation works are finished
Water Resources	• Transportation, siting and operation of mobile asphalt plant/ or operation of statutory asphalt plant • Construction works linked with asphalt plant siting (construction of seat/ haul roads, etc) • Road leveling • Potholes patching/ cracks priming • Pavement / Carriageway surfacing (laying of asphalt-concrete mixtures, laying cement-concrete slabs, etc.) • Use of hazardous materials, such as combustive-lubricating ones, bitumen, etc./ spraying of bitumen • Heavy machinery and equipment operation • Traffic of construction	**Negative:** • Groundwater pollution due to surface runoff from operating asphalt plant ground • Groundwater pollution due to contaminated surface runoff/ migration of spills/leaks from improperly stored lubricants and construction wastes • Groundwater pollution due to leaks from hauling vehicles during transportation/ loading-unloading • Groundwater pollution by bitumen spills • Increased siltation potential/ sediment runoff into downland waterways (if any) due to modifications of drainage patterns • Groundwater pollution by spills from road accidents of vehicles used for construction works • Disturbance to underground water table due to use of heavy machinery • Increased pressure on water resources due to additional water use for road maintenance works • Groundwater pollution by compounds of wastes produced by infrastructure connected with accommodation facilities during road rehabilitation/ improper sewage facilitates	Temporary/ Local	• To plan carefully construction works to minimize impact on water resources • Minimize collection of water and mud, where possible, to execute road rehabilitation works during dry season • Mitigate run-off velocities and volumes/ design outfalls properly • To prevent leaks/spills during transportation/ loading-unloading of constructional materials • Stockpiles of constructional materials should be covered with fabric or other materials to prevent/ mitigate contaminated runoff • To provide proper stockpiling of constructional materials and disposals of hazardous wastes/ avoid stockpiling on the slopes or near waterways, if any/ contaminated run-off from stockpiles should be drained into ditches with oil traps facilities • Ideally, excavate cutoff ditches around stockpiles to prevent materials from

	vehicles, machinery, etc./ hauling of constructional materials such as bitumen, borrow materials, asphalt-concrete mixtures, concrete, cement-concrete slabs, gravel, etc.) • Rehabilitation of road drainage system (drainage channels, chutes, etc.) • Quarrying/ removal and placing borrow materials • Heating and spraying of bitumen • Constructional materials stockpiling • Construction waste disposals • Establishment of construction camp/ accommodation facilities (sewage facilities, waste disposals, etc.)	**Positive:** • Decreased risk of water pollution resulting from rehabilitation of drainage systems as compared to previous road condition • Decreased risk of under-flooding resulting from rehabilitation of drainage system as compared to previous road condition • Decreased risk of sedimentation/ turbidity of waterways (if any) resulting from expected lower erosion potential	Permanent/ local	being washed away by surface runoff/ arrange interception ditches to prevent muddy water to reach waterways (if any) • All lubricants and engine oils should be collected and recycled or disposed off site • Design drainage system to ensure soil stability/ soil erosion prevention and thus to avoid surface water pollution by suspended solids • Where possible, maintain natural drainage • Water for road construction works should be obtained from such sources and used in such amount that would not affect appropriate domestic water supply in the settlements • To avoid loss of vegetation during road rehabilitation works • Re-vegetation or physical stabilization of eroded slopes along the road • Restoration of damaged lands, planting of grass and trees • To organize properly accommodation/ sanitary facilities for workers • To clean up the area after the construction work is completed
Air/ Acoustic	• Asphalt plant operation • Traffic of vehicles used for road/ hauling of constructional materials and construction wastes	**Negative:** • Emissions from mobile/ statutory operating asphalt plant • Air pollution by components of combustion gases (CO_2 , NOx). • Air pollution by volatile hydrocarbons aggravated by unfavorable whether conditions (wind, hot, etc) • Local impairment of air quality during crushing and mixing of raw	Temporary/ Local	• To plan carefully construction works to minimize air and acoustic pollution • Control construction methods and used machinery and equipment • Careful timing of works in residential areas)/ restrict construction to certain

	• Heating of bitumen • Crushing and screening of materials	materials • Noise pollution and vibrations from hauling vehicles, operating machinery and equipment **Positive:** • Decreased risk of air pollution due to reduction of combustion gases emissions into the air	Permanent/ Local	hours • To avoid laud beep signals in settlements/ to minimize disturbance to residents • Restrictions speed of construction vehicles, especially in residential areas • Either use of sprinkling-machines "inhaling" dust… • or control by water or other means/ water spaying twice a day during construction to avoid dust • Watering of access roads to minimize dust formation, if applicable • Vehicles delivering materials should be well maintained and covered to prevent/ reduce spills, emissions and dispersion
Fauna and flora/ habitats	• Construction and operation of asphalt plant • Road rehabilitation works (leveling/ potholes patching/ cracks priming/ pavement) • Use of hazardous materials, such as combustive-lubricating ones, bitumen/ heating and spraying of bitumen • Heavy machinery and equipment operation • Traffic of construction vehicles, machinery, etc. • Hauling of constructional materials • Rehabilitation of road drainage system (drainage channels, chutes, etc.) • Constructional materials stockpiling • Construction waste	**Negative:** • Soil and water pollution due to operation of asphalt plant • Soil and water pollution by hazardous and toxic substances • Impact on biota due to contaminated environmental media (air, water, soil) • Noise pollution/ vibration due to operation machinery/ equipment • Noise pollution due to traffic of construction vehicles • Disturbance to habitats/ loss of fauna and flora species during road rehabilitation works • Disruption of wildlife passages, local migration routes and patterns causing increased road kills, etc. • Changes to aquatic eco-systems due to increased sediment runoff into waterways due to construction/ modification of drainage patterns	Temporary/ local	• To plan carefully construction works to minimize impact on flora, fauna, habitats/ careful siting, alignment, design of associated infrastructure to minimize impacts (especially in sensitive arias, if appropriate) • Careful timing of works and work seasonally, as appropriate/ no construction during breeding season • Trees and other vegetation should be protected during bitumen spraying • To avoid excessive/ to minimize loss of vegetation during road rehabilitation works • Big potholes should be either covered or sand or fenced if they are going to left opened over nigh • To avoid loud beep signals from vehicles and machinery in the areas where wild animals inhabit • Ideally, to provide passages through the road for animals/ wire fence in sites where wild animals inhabit

	disposals			• Careful selection of sites to be used for constructional materials stockpiles/ construction wastes disposals • Use of appropriate construction methods • Clean-up of construction sites • Rehabilitate work sites/ asphalt plant operation sites quarries/ borrow areas, access roads by planting grass and trees and other relevant measures
Landscape/ Aesthetic	• Siting of mobile asphalt plant, if appropriate/ relevant construction works • Construction of detours/ access routes/ haul roads • Earthworks/ quarrying/ removal and placing borrow materials • Traffic of construction vehicles/ heavy machinery and equipment operation • Construction/ rehabilitation of road drainage system • Constructional materials stockpiling • Construction waste disposals • Establishment of construction camp/ accommodation facilities	**Negative:** • Local visual impacts/ marred landscape • Damage to vegetation along the roads • Damage to or degradation to some natural and manmade landscape valuable sites, if any, due to easier access • Loss of trees and other vegetation • Dust, waste, debris etc. during road rehabilitation works **Positive:** • Improved manmade landscape	Temporary/ Local Permanent/ Local	• To minimize construction site's size to minimize impact on landscape/ careful planning, siting and design of works • Screening/ fencing of intrusive items • Careful de-commissioning of construction areas/ waste disposal sites// clean up construction sites after road rehabilitation works are finished/ re-vegetation of work area, etc. • Excavated materials, if any, should be used for backfilling of borrows and gravel pits
Human health / settlements	• Road rehabilitation works: o excavations and other earthworks o leveling/patching/priming o pavement o crushing and screening of	**Negative:** • Road accidents due to disruption of traffic flows due to road maintenance works • Health impact on construction workers due to work with toxic and hazardous materials (damage to respiration system, skin, eyes, etc) aggravated by unfavorable weather conditions (strong wind, rain, etc.) • Impact on human health due to: o Polluted by combustion gases and dust air along the roads	Temporary/ Local	• To train personnel on occupational safety and measures towards compliance with occupational safety requirements • Appropriately experienced contractor, good supervision, careful planning and scheduling of work activities • Incorporation of safety and environmental requirements in contract

	materials o heating of bitumen o repair of aggregates o construction & reconstruction of drainage channels; etc. • Hazardous, toxic and inflammable materials loading-unloading, transportation and disposal • asphalt plant operation • traffic of construction vehicles • Constructional materials stockpiling • Construction waste disposals	o Polluted surface run-off into adjacent agricultural lands and agricultural plants contamination o Noise pollution and vibrations from construction works, traffic of vehicles and operating machinery/ equipment • Fire and explosion hazards due to accidents during road construction works • Construction vehicles road accidents • Accidents during road rehabilitation works (spills, blasts, etc.) • Accidents due to disruption of traffic flows due to road construction works • Pressure on local water supply sources		documents/ providing of workers with uniform, glasses, gloves, etc. • Foreseeing compensations in case of health damage • Fencing of dangerous areas (stockpiling of hazardous materials) • Excavated potholes should be either covered with crushed stone or sand or fenced if they are going to left opened over nigh • Avoid work during unfavorable weather conditions to minimize risk of accidents/ bitumen should be not applied during strong winds or heavy rains • Proper establishment of construction camp/ temporary accommodation • To ensure accident prevention for population in residential areas/ to plan carefully construction works to minimize impact on local residents • Restrict transportation of hazardous/ explosive materials in residential areas/ comply with regulation on transportation of hazardous materials • Restrict construction vehicle speed limits, especially in residential areas • Careful timing of works to minimize disturbance especially during night time • Ideally, to design acoustic barriers along the roads in residential areas • To construct/ rehabilitate sidewalks in residential areas/ the required width of the sidewalk corresponds to the intensity of pedestrian's traffic (final determination of the location shall be arranged with local stakeholders) • Road warning signs posting to warn road users about rehabilitation works/ warn road users about traffic diversion • Provide advise to the public on

		Positive: • Decreased risk of car and local residents accidents due to improved road conditions • Decreased risk to health damage due to reduction of air pollution by combustion gases • Decreased risk to health damage due to lessening of polluted surface runoff to agricultural lands	Permanent/ Local	shorter alternative routs/bypasses • To ensure proper constructional materials stockpiling/ construction waste disposals • Stone crushing plants; asphalt plants should be fitted with approved dust control devices and operate in accordance with environmental protection requirements and manufacturer' specifications • To ensure regular watering of roads under rehabilitation to minimize formation of dust • Ideally, to install speed calming devices, e.g. humps, in residential areas • To ensure emergency medical service/ to provide telephone communication • To ensure proper sanitary-hygienic facilities (sewage disposal)/ appropriate waste disposal • Water for road construction works should be obtained from such sources and such amount that would not affect appropriate domestic water supply in the area of concern
Social/ Economic	Road rehabilitation	**Positive:** • Creation of job opportunities/ recruitment of the labor force among local population/ temporary decrease of unemployment in residential areas along the road • Development of relevant work skills at local residents • reduction of vehicles operating cost; • less fuel consuming, • safe driving and riding; • better transportation conditions/ less time for transportation of	Permanent / local	

		passengers, goods, livestock, etc. • opportunity to create new work places along the road: filling station, shops bars, parking facilities • improved communication opportunities between settlements/ local residents etc.		

Table 2. Environmental and Social Impacts for Road Operation Phase

Environmental and social components	Project activity	Potential Negative and PositiveImpacts	Scale of the impact	Suggested Mitigation Measures
Soils and land	Existence of the road Surface runoff from the road Vehicles traffic Passenger/ goods transportation Road associated infrastructure	**Negative:** • Continuous damage to land/ erosion and landslide potential/ formation of gullies on slopes along drainage channels • Soil pollution due to contaminated by fuel and its compounds (esp. heavy metals) surface runoff • Soil pollution due to run-off/migration of spills/leaks from vehicles • Soil pollution by wastes produced by infrastructure connected with services located along the road (parking, food facilities, filling stations, restaurants, bars, shops, etc.) **Positive:** • Decreased land degradation potentials/ gullies formation as compared to previous road conditions • Reduced soil pollution, soil erosion and landslides resulted from rehabilitated drainage system • Decreased risk of landslides due to slope stabilization	Permanent/ Local Permanent/ Local	• Planting of trees and bushes along the roads (on an appropriate distance) • To provide roadways/ protection strips along the roads, if appropriate • Proper construction of road drainage system • Road police and ecological authorities to check regularly vehicles quality and their compliance with standards quality • Road police to properly control traffic of vehicles to minimize risk of accidents • To control properly development and operating of road associated infrastructure/ food, sanitary/car filling/ parking facilities • To undertake continuous measures towards prevention and minimization of erosion
Water Resources	Existence of the road Traffic of vehicles Surface runoff from the road Passenger/ goods transportation Road associated infrastructure	**Negative:** Pollution of groundwater by contaminated surface runoff from the road: o compounds of fuel (esp. heavy metals) o petroleum hydrocarbons Accidental pollution of groundwater by spills during road accidents Reduction in groundwater recharge due to installed road drainage system Potential for interrupting or lasting lowering of underground water table due to road operation Groundwater pollution by wastes produced by road associated infrastructure associated (parking, food, sanitary facilities, filling stations, shops, bars, etc.).	Permanent/ Local	• Road police and ecological authorities to check regularly vehicles quality and their compliance with technical standards quality • Road police to properly control vehicles conditions to minimize risk of accidents/ accidental spills • To control properly road drainage system to avoid soil erosion/ sedimentation of waterways/direct runoff to waterways/ turbidity of waterways • To plant trees and bushes to prevent surface erosion and landslides

		Positive: • Reduced water pollution resulted from rehabilitated drainage systems as compared to previous road condition • Decrease risk of under-flooding due to rehabilitated drainage system as compared to previous road condition • Decreased siltation of waterways (if any) due to lower erosion potential as compared to previous road condition • Decreased turbidity of waterways (if nay)/ decreased fine-grained sediment run-off to surface waters as compared to previous road condition	Permanent/ Local	• To control properly development and operation of road associated infrastructure along the roads (food and parking facilities, filling stations, recreation stops, etc.)
Air/ Acoustic	Traffic of vehicles Emission from vehicles	**Negative:** • Air pollution by components of combustion gases (CO_2 , NOx). • Noise pollution/ vibration from traffic of vehicles (esp. tracks) in residential areas **Positive:** • Reduction of emissions into the air / reduction of air pollution by combustion gases as compared to previous road conditions	Permanent/ Local Permanent/ Local	• Designing and planting vegetation (buffer strips) along the roads to minimize spreading of combustion gases • To avoid laud beep signals in settlements/ to minimize disturbance to residents • Ideally, to construct noise prevention barriers in residential areas • Restrictions on vehicles speed, especially along residential areas • Vehicles to comply with engine brake norms, especially in residential areas
Fauna and flora/ habitats	Existence of the road Traffic of vehicles Road associated infrastructure	**Negative:** • Continuous damage to biodiversity • Continuous damage/ disturbance to habitats • Death of wild animals due to road accidents • Disturbance to wild animal passages/ local migration routes and patterns • Changes of aquatic eco-systems due to sedimentation potential in waterways • Secondary contamination of biota due to pollution potential of soil and water in the area of road operation/ pollution of vegetation along the roads by emitted combustion gases and their compounds (esp. heavy	Permanent/ Local	• Traffic signs posting along the roads (indication of speed limits, warning about valuable habitats and animals inhabited in the area, etc) • To ensure stricter control to conserve biodiversity/ poaching and illegal cutting prevention • To provide appropriately designed rest stops to minimize impact on environment

		metals)		• To undertake continuous measures towards prevention and minimization of erosion • Continuous vegetation/ re-vegetation along the roads • To ensure compliance of vehicles conditions with technical standards to minimize risk of environmental pollution (air, soil, water) • Ideally, to provide facilities for wildlife to cross the road, e.g. tunnels • Ideally, to ensure protection measures to avoid danger to animal species due to road accidents (e.g., fences along the roads, where acceptable and possible)
Landscape/ Aesthetic	Existence of the road Road associated infrastructure	**Negative:** • Loss of vegetation/ poor vegetation • Impaired lands/ loss of some land uses along the roads • Garbage/ waste disposals along the roads **Positive:** • Improved visual effects/ improved conditions of surroundings/ manmade landscape	Permanent/ Local Permanent/ Local	• Planting of trees (at allowed distance) and bushes to improve the landscape • Planting of trees to stabilize the slops/ prevent soil erosion and landslides • To control properly development and operation of road associated infrastructure
Human health / settlements	Existence of the road Traffic of vehicles Road crossing by humans and domestic animals Road crossing by cars from country roads Passenger/ goods transportation	**Negative:** • Car accidents • Killed and injured humans due to road accidents • Domestic animals accidents • Damage to health due air pollution by combustion gases and dust (esp. in settlements) • Damage to health due to consumption of agricultural products drown up on adjacent agricultural lands affected by contaminated surface run-off • Noise pollution/ vibrations from vehicles traffic (esp. tracks) • Disturbance to over night sleep in settlements	Permanent/ Local	• To provide regular road quality control and maintenance • To provide highway stripping • To provide emergency strips along the road, where appropriate • To provide outside stone, wire or other suitable types of barriers in dangerous sites on the road, if any, to minimize risk of road accidents • To provide parking facilities for accidental drive in and drive out along the

				road, where appropriate • Road police and ecological authorities to check regularly vehicles quality and their compliance with air, noise and technical standards quality • Restrict vehicle speed limits, esp. at the entrance and in the residential areas in order to minimize the risk of pedestrian's injury • The passage through the village shall be speed controlled in combination with measures for the improvement of visibility: 30 km/h, 50 km/h • Provide pedestrian's sidewalk in the residential areas (esp. in village centers, schools, outside of curves, etc.) • Road police to properly control vehicles traffic to minimize risk of road accidents • Road signs posting with indication of speed limits along the road out of settlements in dependence of type of landscape - flat, hilly; road geometry (curved turnings), etc. • To plant trees along the roads (at allowed distance) to prevent excessive air pollution especially along residential areas • To provide telephone and other communication facilities along the road to immediately inform about accident, if any • To provide road traffic sings with indication of distance to medical centers/ rest facilities/ name of settlements • To organize properly public transport stops to exclude risk of humans accidents. Asphalted bus station shall be organized offside the main road, probably at a side road • Install warning for drivers about pedestrians on the road/ provide facilitates (road traffic signs, regulated traffic lights) for pedestrians to cross the road • Install speed control devices

		Positive: • Decreased number of car accidents due to improved road conditions/ safe driving and riding • Decrease number of killed and injured people due to improved road conditions • Lower damage to health due to reduction of air pollution by combustion gases as compared to previous road conditions • Lower damage to health due to decreased polluted surface runoff to agricultural lands as compared to previous road conditions • Improved communication opportunities between settlements/ local residents	Permanent/ Local	along the road, especially at the entrance to settlements, near rural school, schools, if any
Social/ Economic		**Positive:** • Reduced vehicles operating cost as compared to previous road conditions • Improved access to settlements • Improved access to labor, goods, livestock and other markets • Reduced transportation cost to markets • Improved opportunities for business activities • Development of employment and business opportunities associated with road operation (road associated infrastructure - shops, bars, restaurants; selling of homemade articles and household agricultural products, etc.) • Increase of household income • Reduced time needed to reach destination point • Improved access to hospitals/ health centers and educational institutions for rural population • Improved access to recreation sites in rural area • More opportunities for tourism business development (easier access to cultural, natural and other heritage sites) etc.	Permanent/ Local	

Table 3. Environmental and Social Impacts for Road Maintenance Phase

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
Soils and land	• Periodical & Routine maintenance: • light - & medium –scale grading • Culvert repair ▪ Clearance of drainage channels ▪ Leveling of roadsides ▪ Potholes patching ▪ Cracks priming ▪ Winter maintenance (snow removal, dusting by sand-salt mixture) • Operation of machinery and equipment • Traffic of construction vehicles • Constructional materials stockpiling • Construction wastes disposals • Short-term accommodation facilities for road workers	**Negative:** • Land damage and soil pollution along the road due to disposal of constructional materials, leaks from road maintenance machinery and equipment • Soil pollution due to surface run-off contaminated by petroleum hydrocarbons/ engine oil, lubricants/ compounds of fuel (esp. heavy metals) • Soil pollution by spills due to vehicles accidents and broken equipment, vehicles and machinery used for road maintenance works (engine oil, lubricants) • Soil pollution due to improperly arranged constructional materials and wastes disposals • Soil pollution due to improperly arranged accommodation facilities for workers (sewage system, etc.) **Positive:** • Decreased risk of soil pollution, soil erosion and landslides resulting from maintenance of drainage system • Decreased risk of land degradation potentials/ gullies formation	Temporary/ Local Permanent/ Local	• To plan carefully maintenance works to minimize surface area under the impact from road maintenance activities/ to ensure construction work accuracy • Excavated materials should be appropriately stockpiles and covered so that they will be not washed away into downland watercourses • Form offshoots to split flow in the drain to minimize risk of soil erosion • Ideally, to construct ditches, soak pits to prevent waste water being discharged into agricultural land and homesteads to minimize risk of soil pollution • To ensure accuracy of machinery and equipment used for maintenance works to minimize risk of accidental spills • To ensure appropriate stockpiling of constructional materials • To ensure proper construction waste disposal sites • To organize properly short-term accommodation facilities to prevent soil pollution and damage to land • Ideally, to fence repair area to restrict damage of surrounding lands • To clean up the work area after repair works are completed
Water Resources	• Periodical & Routine maintenance: • light - & medium –scale	**Negative:** Groundwater pollution due to surface run-off contaminated by petroleum hydrocarbons/ engine oil, lubricants/ compounds of fuel (esp. heavy	Temporary/ Local	• To plan carefully maintenance works to minimize surface area under the impact from roan maintenance activities

	grading • Culvert repair/ replacement ▪ Clearance of drainage channels ▪ Levelling of roadsides ▪ Potholes patching ▪ Cracks priming ▪ Winter maintenance (snow removal, dusting by sand-salt mixture) • Operation of machinery and equipment • Traffic of construction vehicles • Constructional materials stockpiling • Construction wastes disposals • Short-term accommodation facilities for road workers	metals) Groundwater pollution by spills due to vehicles accidents and broken equipment, vehicles and machinery used for road maintenance works (engine oil, lubricants) Groundwater pollution due to improperly arranged constructional materials and construction wastes disposals Groundwater pollution by wastes produced by infrastructure connected with temporary workers' camps (improperly arranged toilet facilities, etc.) Groundwater pollution due to improperly arranged accommodation facilities for workers (sewage system, etc.) Increased siltation potential/ sediment runoff into downland waterways (if any) due to repair/ clearance of drainage channels/ culvers Increased turbidity of downland waterways (if any) Increased pressure on water resources due to additional water use for road maintenance works **Positive:** • Decreased risk of water pollution/ sedimentation/ turbidity of waterways resulting from maintenance of drainage systems • Decreased risk of under-flooding resulting from maintenance of drainage system	Permanent/ Local	• To ensure accuracy of road maintenance works/ machinery and equipment used for repair work • To provide proper stockpiling of constructional materials • To provide proper constructional materials waste disposals • Excavated materials should be used properly stockpiled and covered to prevent their washing away • To arrange interception ditches, to prevent muddy water to reach waterways (if any) • To provide infiltration ditches/ soak pits to prevent direct contaminated water discharge • All lubricants and engine oils should be collected and recycled or disposed off site • To organize properly short-term accommodation facilities for workers • To clean up the work area after repair works are completed • Water for road maintenance works should be obtained from such sources and such amount that would not affect appropriate domestic water supply in the area of concern
Air/ Acoustic	• Periodical & Routine maintenance: ▪ Rood repair works • Culvert repair/ replacement/ clearance of drainage channels	**Negative:** • Emissions into the air/ air pollution by components of combustion gases (CO_2 , NOx) • Local impairment of air quality during mixing of raw materials • Noise pollution/ vibration from traffic of construction vehicles and operating machinery and equipment	Temporary/ Local	• To plan carefully maintenance works to minimize air and acoustic pollution • Control road maintenance methods and of works (to avoid

	▪ Winter maintenance • Traffic of construction vehicles • Operation of machinery and equipment	**Positive:** • Decreased risk of air pollution due to reduction of combustion gases emissions into the air as a result of proper maintenance of the road	Permanent/ Local	maintenance works in residential areas over night) • To minimize disturbance/ restrict road maintenance works to certain hours/ timing of works • Either use of sprinkling-machines "inhaling" dust… • or control by water or other means/ water spaying twice a day during construction to avoid dust • Speed restrictions of vehicles used for road maintenance, especially in residential areas • Vehicles transported materials for road maintenance (e.g., sand) should be covered to avoid extra dusting
Fauna and flora/ habitats	• Periodical & Routine maintenance: • Repair of pavement • Culvert repair/ replacement/ clearance of drainage channels • Care of vegetation along the road ▪ Winter maintenance • Operation of machinery and equipment • Traffic of construction vehicles • Constructional materials stockpiling • Construction wastes disposals • Short-term accommodation facilities for	**Negative:** • Disturbance to habitats • Disturbance to wild animals passages, local migration routes and patterns • Death of wild animals due to road accidents • Pollution of vegetation along the roads by heated emitted combustion gases and their compounds (esp. heavy metals) and other hazardous substance • Pollution of environmental media (soil, water, air) • Noise pollution/ vibration due to operation machinery/ equipment • Noise pollution due to traffic of construction vehicles • Disruption of wildlife passages, local migration routes and patterns causing increased road kills, etc. • Changes to aquatic eco-systems due to increased sediment runoff into waterways due to repair/ replacement of drainage system	Temporary/ Local	• To plan carefully road maintenance works to minimize disturbance to habitats/ animal species inhabited in the area • Careful timing of works and work seasonally, as appropriate/ no construction during breeding season • Trees, vegetation should be protected during bitumen spraying • Proper arrangement of constructional material stockpiles and construction waste disposals to minimize environmental pollution • Excavated potholes should be either covered with crushed stone/sand or fenced if they are going to left opened during certain period of time • To arrange properly

	road workers	**Positive:** • Care of green plantations along the roads	Permanent/ Local	accommodation facilities to minimize environmental pollution • Clean-up the site after work maintenance works are finished
Landscape/ Aesthetic	• Road repair works • Stockpile of constructional materials/ construction waste disposals	**Negative:** • Littering of territory adjacent to the road • Damage to landscape due to waste & excavated materials disposals/ stockpiling of constructional materials **Positive:** • Improved manmade landscape	Temporary/ Local Permanent/ Local	• To plan carefully maintenance works to minimize impact on landscape • Clean-up the site after work maintenance works are finished • Excavated materials, if any should be used for backfilling of borrows and gravel pits • To arrange properly accommodation facilities
Human health / settlements	• Road repair works • Traffic of construction vehicles • Operation of road repair machinery/equipment • Stockpile of constructional materials/ construction waste disposals • Short-term accommodation facilities for road workers	**Negative:** • Road accidents due to disruption of traffic flows due to maintenance works • Impact on human health due to: o Polluted by combustion gases and dust air along the roads o Polluted surface run-off into adjacent agricultural lands o Noise pollution/ vibrations from hauling tracks/ moving vehicles and working equipment • Fire and explosion hazards due to accidents during road maintenance works • Health impact on road workers due to work with hazardous materials • Pressure on local water supply sources	Temporary/ Local	• To train road workers on occupational safety • Restrict vehicle speed limits, esp. at the entrance and in the residential areas in order to minimize the risk of humans injury • Warning signs posting and advice for drivers to use alternative roads to avoid delays due to road maintenance works • Road signs posting with indication of speed limits • To control vehicles traffic during road maintenance works • To provide telephone and other communication facilities to immediately inform about accident, if any • Excavated potholes should be either covered with crushed stone or sand or fenced if they are going to left opened over nigh to avoid humans injury • Excavate cutoff ditch around stockpiles to prevent materials being washed away by surface runoff to minimize

		Positive: • Decreased risk of car and local residents accidents due to properly maintained road conditions • Decreased risk to health damage due to reduction of air pollution by combustion gases as a result of properly maintained road conditions • Decreased risk to health damage due to lessening of polluted surface runoff to agricultural lands as a result of properly maintained road conditions	Permanent/ Local	risk of soil and water pollution • Stockpiles materials should be covered with fabric or other materials; • Avoid stockpiling near waterways (if any) or on slopes • Proper stockpiling of constructional materials and construction wastes disposals • Water for road maintenance works should be obtained from such sources and such amount that would not affect appropriate domestic water supply in the area of concern • To ensure proper accommodation facilities for road workers to minimize possible health impact
Social/ Economic	• Road maintenance works	**Positive:** • Job opportunities for local people/ giving preferences to local communities in awarding road maintenance labor contracts • Development of relevant work skills • etc. (for details refer to Table 1)	Temporary/ Permanent/ Local	

Annex 3. Model[23] of the Environmental Screening Checklist for road sub-projects

PART 1 (to be completed by the SRA environmental specialist with assistance from the SRA field engineer and consultant assistance (as needed)

1. Sub-project Name:

2. Format for brief description of sub-project[24].

Item	Description
nature (background) of the sub-project	
sub-project objectives	
physical size (length, (km), other indicators (if applicable)	
site area (location)	
executing agency (if known)	
beneficiaries	
type of sub-project (new road, expansion, rehabilitation or maintenance),	
appurtenant facilities (bridges, warehouses, deposits, carriers, asphalt plants, etc.) with short description	

3. Format for brief description of sub-project corridor and related sites[25]

Item		Description
Socio-economic environment	Affected inhabitants (localities, population, indigenous peoples, etc)	
	Land use along the road (urban, agricultural, forests, pastures, waters, historic/cultural sites, nature protection sites, etc.)	
	Local economy (industry, farming, fishery, commerce, etc.)	
	Transportation (traffic rate, passengers, goods, livestock, etc.)	
Natural environment	Topography and geology (slopes, ravines, landslides, soft grounds, wetlands)	
	Surface and groundwater (rivers, hydrology, water table, water sources, water quality, etc.)	
	Fauna and Flora, (habitats of rare and endangerous species, migration, major ecosystems, etc.)	
Pollution	Existing known sources of air, soil, water pollution and wastes.	
Other		

4. Format for potential environmental impacts identification[26]

[23] Model is prepared as example and may be slightly modified if specific aspects will be found important during sub-project selection.
[24] Format to be filled by available existing data and information. In some cases professional judgment may be apply with relevant indications.
[25] Format to be filled by available existing data and information. In some cases professional judgment may be apply with relevant indications.

Item	Evaluation (short description of anticipated impacts and its significance)		If any additional study will be required (YES/NO) if YES indicate details	If mitigation measures will be required (YES/NO)
	Construction Phase	Operational Phase		
Socio-economic environment				
Resettlement				
Economic activities				
Traffic and public facilities				
Cultural/historic property				
Rights (land, water, common)				
Public health				
Hazards (risk)				
Natural environment				
Topography and Geology				
Soil				
Surface water				
Groundwater				
Flora and Fauna				
Pollution				
Air pollution				
Water pollution				
Soil contamination				
Noise and Vibration				
Offensive odor				
Wastes				
Other				

Important issues to be considered during evaluation of impacts are summarizing below as examples for assessment:

- Resettlement - needs for re-allocation of peoples, houses, facilities due to additional land occupancy
- Economic activities – loss or significant limitation for normal economic activities near sub-project corridor (sites)
- Traffic and public facilities – impacts on present traffic conditions (car's speed, traffic rate, accidents, use of detour roads and relevant impacts) and impacts to vulnerable public facilities (schools, hospitals, etc.)
- Cultural/historic property – damage or loss of value of churches, temples, archeological remains or other cultural assets
- Rights (land-use, water-use, water abstraction, common) – obstruction of respective rights due to construction (temporal or permanent)
- Public health – worsening of public health due to air pollution and wastes
- Hazards (risk) – increase in danger from ground failure, landslides, ravines, etc.
- Topography and Geology – changes of valuable topography and geology due to excavation works, deterioration of aesthetic harmony by structures

[26] Will the sub-project have impacts on the environmental parameters listed below during construction or operational phases? Indicate during what phase impacts will occur, is any additional study will be required and whether mitigation measures are required with a check.

- Soil – top soil erosion by rainfalls due to land reclamation, improvement of roads sides, cleaning of water by-pass
- Surface water – changes of river flows, sedimentation and riverbeds conditions due to construction and bridges repairing
- Groundwater – changes of groundwater table and flows due to construction works
- Flora and Fauna – loss or significant impacts to natural habitats, particularly to rare species, obstacles for migration
- Air pollution – pollution caused by exhaust gas, operation of asphalt plants, transportation of constructional materials
- Water pollution – pollution caused by accidental spills, improperly stored lubricants, wastes, constructional materials, etc.
- Soil contamination – due to wastes and spills
- Noise and Vibration – generated by construction machines, vehicles, construction works
- Offensive odor – generated by asphalt preparation facilities, bitumen works, etc.
- Wastes – generated during construction
- Other – other potential impacts and impacts of unfavorable natural factors to the sub-project operation (like floods, extreme temperatures, strong winds, rainfalls, etc.)

5. Format for identification of mitigation measures[27]

Environmental Issue	Phase (C, O or B)	Description of mitigation measures

6. Summary of public consultation (location, participants, summary conclusion, comments)

_____
_____
_____
_____
_____

[27] For the environmental issues that were indicated under point 4 with a check, describe the mitigation measures that will be included during the construction (C) or operational (O) phase of the sub-project or both (B)

PART 2 (to be completed by the SRA environmental specialist and confirmed by the relevant environmental authority (Rayon Ecological Inspector, State Ecological Inspectorate, State Ecological Expertise) based on the findings of the environmental screening and scoping process)

7. Environmental "Risk" Category (B or C) _____

8. Are additional specific studies required? (YES or NO) _____, if YES provide details and specific issues to be addressed:

_____
_____

9. What type of Environmental Assessment is required? (Simple EMP or EIA and EMP)

_____

10. Is the State Ecological Expertise required? (YES or NO) _____, if YES provide details (authority to submit for reviewing, list of documentation required, time-schedule for reviewing, etc.):

_____
_____

11. What major environmental and social issues are raised by the sub-project and to be included in the simple EMP or EIA and EMP?

_____
_____
_____
_____

12. What is the time frame and estimated cost of (1) conducting additional specific studies, (2) preparation of simple EMP, or (3) preparation of EIA and EMP ?

_____
_____
_____
_____

Signatures (and stamps if applicable):

<u>On behalf of SRA</u>

SRA Environmental Specialist:
Date:
SRA consultant (if needed):
Date:

<u>On behalf of reviewing authority</u>

Reviewing authority:
Name of reviewer:
Working position of reviewer:
Date:

Annex 4. Model[28] for simple Environmental Management Plan (category C sub-projects)

Sub-project activity	Potential impacts (effects)	Mitigation measures	Monitoring requirements
1. Planning and Design			
1.1. Setting design criteria			
1.2. Design, general			
1.3. Design, drainage (if applicable)			
1.4. Design, asphalt factory (if applicable)			
1.5. Design, (specify any other applicable designs)			
1.6. Land acquisition (if applicable)			
1.7. Modification of normal traffic (speed regulation, use of detour roads, etc.)			
1.8. Restrictions (within residential areas, livestock road passing, for bridges, etc.)			
2. Construction Mobilization			
2.1. Mobilizing Equipment			
2.2. Mobilizing Workforce			
2.3. Establishing and Operation of Labor Camp(s)			
2.4. Establishing and Operation of Base Camp, Deposits, other Facilities and Workshop(s)			
2.5. Setting up and Operation of Asphalt Plant and Asphalt preparation area.			
2.6. Operation of Quarry(ies) or Borrow Pit(s)			
3. Construction			
3.1. Earthworks (specify if applicable)			
3.2. Drainage works (specify if applicable)			
3.3. Other works if applicable			
3.4. Pavement base construction (specify if applicable)			
3.5. Bituminous Surfacing (specify if applicable)			
3.6. Transportation of project materials			
4. Maintenance			
4.1. Periodical & Routine maintenance (grading, culvert repair, clearance of drainage, potholes patching, winter works)			
4.2. Operation of machinery and equipment			
4.3. Traffic of maintaining machines			
4.4. Maintaining materials stockpiling and depositing			
4.5. Short-term accommodation facilities for road workers			

[28] Model is prepared as example only and should be adapted to the specific aspects of the sub-project.

Annex 5. Example[29] of the environmental clauses for contract documents in construction

General

- Notwithstanding other obligations, if, in the opinion of the Engineer, damage is being done to the environment by the Works under construction the SRA environmental specialist or SRA supervising engineer may instruct the Contractor to cease work immediately, or change the approach or method of work.
- The Provisional sum, Item ____ in the Bill of Quantities, is for any work deemed to be required by the Engineer to remedy any unexpected environmental problems, or potential environmental problems, which may arise as a result of the Works. The Engineer may instruct either the Contractor, or a nominated Subcontractor, to carry out the work.
- The Contractor shall ensure that full consideration is given to the control of environmental aspects, and that all provisions of the design and specification requirements relating to pollution of the environment, and protection of adjacent land and waterways, are complied with.

Road works

- Mobilization of heavy equipment to and from the site shall be carried out at time of lowest traffic on the routes used.
- The Contractor shall use selected routes, as advised by the Engineer, and appropriately sized vehicles suitable to the class of road, and shall restrict loads to prevent damage to roads and bridges used for transportation purposes to the project site. The Contractor shall be held responsible for any damage caused to the roads and bridges due to the transportation of excessive loads, and shall be required to make good such damage to the approval of the engineer.
- The Contractor shall not use any vehicles, either on or off road, whose exhaust or noise emissions are grossly excessive, and in any built up areas noise mufflers shall be installed and maintained in good condition on all motorised equipment under the control of the Contractor.
- The Contractor shall limit construction works to between 6am and 10pm if it is to be carried out in or near residential areas. The Contractor shall also avoid the use of heavy or noisy equipment in specified areas late at night, or in sensitive areas such as near a hospital.
- To prevent dust pollution during dry periods the Contractor shall carry out regular watering of earth and gravel haul roads and shall cover soil haulage trucks with tarpaulins if the soil is dry.
- Adequate traffic control measures shall be maintained by the Contractor throughout the duration of the Contract, and prior to any restriction being applied to two way traffic movement written permission must be obtained from the Engineer for the proposed traffic control measures to be used and for the length of time the restriction is proposed to be in place.
- The Contractor shall recruit locally as large a proportion of the workforce as is possible, and shall provide appropriate training where necessary.
- The Contractor shall install and maintain a temporary septic tank system for any residential labour camp established and ensure that this does not cause any pollution of nearby watercourses. The contractor shall also make the system inoperative and safe on completion of the contract and the removal of the camp.

[29] Taken from "Environmental Guidelines for reducing the environmental effects of road projects in Lao People's Democratic Republic, 1995" and should be used as example only. It should be carefully adapted to the specific sub-project activities, related potential effects identified and mitigation measures proposed.

- The Contractor shall establish a method and system for storing and disposing of all solid wastes generated by the labor camp and/or the base camp.
- The Contractor shall not allow the use of fuelwood for heating or cooking in any labor or base camp but shall provide alternate facilities using other fuels.
- The Contractor shall ensure that site offices, depots, asphalt plants and workshops are located in appropriate areas, as approved by the Engineer, and not within 500 metres of existing residential settlements, and asphalt plans not within 1000 metres.
- The Contractor shall also ensure that site offices, depots and particularly storage areas for diesel fuel and bitumen, and asphalt plants, are not located within 500 metres of watercourses, and are operated so that no pollutants enter watercourses, either overland or through groundwater seepage, especially during periods of heavy rain. This will require lubricants to be recycled and a ditch to be constructed around the area with an approved settling pond/oil trap at the outlet.
- The contractor shall not use fuelwood as a means of heating during the processing or preparation of any materials forming part of the Works.

Quarries or Borrow Pits

- Approval to open a new borrow area on land or in river, or to operate an existing area, hall be obtained from the Engineer in writing before any borrow operation is commenced, and the operation shall cease immediately and permanently at any location when instructed to by the Engineer. Pits shall be prohibited, or have restrictions applied to their operation, where they might interfere with the natural or designed drainage. River locations shall be prohibited where they might undermine or damage the river banks or cause too much fine material to be carried downstream.
- The Contractor shall ensure that all borrow pits used are left in a trim and tidy condition with stable sides and slopes, and drained so that no stagnant water bodies are created which could breed mosquitoes.
- Rock or gravel won from a river shall be removed over some distance so as to limit the depth of material removed to one tenth of the width of river at any one location, and not disrupt the river flow or damage or undermine the river banks.
- The contractor shall ensure that rock crushing plants are located as approve by the Engineer, and not close to environmentally sensitive areas, or within one kilometer of existing residential settlements, and operated with approved dust control devices fitted.

Earthworks-General

- The Contractor shall not carry out any earthworks during the rainy season unless specific permission is obtained in writing from the Engineer or his representative for properly controlled earthworks at specific locations.
- The Contractor shall maintain stable cut and fill slopes at all times and shall cause the minimum possible disturbance to areas outside the prescribed limits of the work.
- The Contractor shall complete cut and fill operations to final cross-sections at any one location as soon as possible and preferably in one continuous operation and not leave partly completed earthworks, especially during the rainy season.
- The Contractor shall ensure that any cut or fill slopes are planted in grass or other plant cover as soon as possible to protect them from erosion.
- To prevent erosion cut off drains and toe-drains shall be provided at the top and bottom of slopes as shown on the drawings or as directed by he Engineer.

Earthworks - Disposal of Surplus Material

- Any spoil cut to waste, or material removed from drains, shall be disposed of to designated stable tipping areas as directed b) the Engineer, and separate items are included in the Bill of Quantities to allow for this.
- Side tipping of surplus excavated material shall only be permitted where specifically allowed by the Engineer.

- Before starting any earth-moving operation at any location the Contractor shall obtain the Engineer's approval of the areas he proposes to use as waste dumps.
- Locations for waste dumps are not to be sites where they will cause future slides, interfere with agricultural land or any other properties or cause soil from the dump to be wasted into any watercourse. During may need to be dug within and around the waste dumps as directed by the Engineer and this, together with the proper placement of the spoil, should be allowed for in the cut to waste item in the Schedule of Quantities. The only item in the Schedule of Quantities paid for separately is the haul distance (m^3 times kms) to the waste dump directed by the Engineer.

Drainage Works

- The Contractor may need to construct temporary drains and particularly temporary sedimentation basins and brushwood barriers to avoid excessive sedimentation entering local streams river or lakes. These works will be carried out by the Contract when instructed to by the Engineer but no separate payment will be made for the work. The onus is therefore on the Contractor to carry out all works in such a manner so as to avoid erosion and the subsequent of sedimentation.

Annex 6. Outline of EIA and EMP (category B sub-project)

Typical EIA and EMP report will include following considerations and modalities.

Summary
A summary of the main findings of the study, including the major positive and negative impacts, proposed mitigation measures and monitoring should be prepared.

Sub-project development objectives
A brief description of the sub-project is required which states objectives, expected alignments, new construction, major rehabilitation works, area of influence, including length and location, environmentally and socially sensitive sites.

Policy context (WB, national legislation)
A brief description of WB, EBRD, IDA and other donors in relation to the expected development is required as well as national policy and legal content. Other national/local plans, programs and projects within the area of influence can be shortly described and evaluated in the context of road development objectives.

Baseline
Baseline information for the sub-project area of influence and for proposed alternatives should be collected, stating actual environmental status and clearly present indicators for further monitoring of impacts. Baseline information is typically includes socio-economic environment, bio-physical environment and existing pollution sources. Issues to be studied may include:

- Topography, geology
- Soils
- Climate and rainfalls
- Land use
- Population
- Livestock
- Major economic activities
- Public health
- Sites of cultural and historic value
- Surface and ground waters
- Ecosystems and habitats
- Protected natural areas
- Local government set up
- Other

Much of this information can be obtained from existing environmental reports, environmental action plans, local development plans, statistical office, local governments. In some cases additional studies may be required if important and feasible.

Project Components
This covers the basic design details, for example:

- Type of road (bitumen, gravel, earth)
- Length for improvements
- Number and lengths for new construction, alignments
- Number of bridges, drainage structures, underpasses, etc.

The types of activities, envisaged during the sub-project to be described under different phases:

Site preparation (mobilization) eg. cleaning of vegetation for camps, realignments,

	deviations; excavation of quarries; access routes to quarries, deposits, asphalt plants, workshops, detour roads, etc.
Construction	eg. earthworks, haulage, drilling, production of asphalt, crushing, etc.
Build facilities	eg. labour camps, base camp, deposits, plants, workshops, machinery equipment, etc.
Operations	eg. occupational safety, location and number of labour camps, sources and supply of materials, etc.
Closure and restoring	eg. rehabilitation of camp sites, wastes places, etc.

It is also important to prescribe in short any capacity buildings elements and trainings planned under the sub-project.

Specific (technical, technological, location, time, season, etc.) alternatives should be defined with short description.

Assessment of Environmental Impacts and Alternatives

Assessment of impacts are originated from the sub-projects (and alternatives) should be conducted for socio-cultural, bio-physical, and human environments and should include both negative and positive impacts. Impacts should be evaluated by type (long or short term; local/specific or widespread; permanent or temporal; reversible or irreversible; seasonal or perennial; cumulative or not; direct or indirect) and magnitude (significant, moderate, minor or negligible). The results of assessment may be presented by the different formats as shown below:

Environmental issues	**Classified impacts (negative/positive; type; magnitude) during:**				**Mitigation**	**Comments**
	Mobilization	**Construction**	**Operation**	**Maintenance**		

Project interventions at different phases	**Environmental impacts**		**Impacts classified by:**		**Mostly affected environment**						
							Bio-physical				
	Positive	**Negative**	**Type**	**Magnitude**	**Socio-economic**	**Human**	**Ambient air**	**Surface water**	**Groundwater**	**Soil**	**Biodiversity**

Specific (technical, technological, location, time, season, etc.) alternatives (eg. for labour camps, detour roads, quarries, realignments, equipment) should be evaluated, compared and recommendations for the most preferable options should be given.

Environmental Management Plan

The basic elements of an EMP are a Mitigation Plan and Monitoring Plan. When the mitigation measures have been established, a Mitigation Plan must be drawn up indicating where each measure is to be incorporated in the design, when it should be implemented, who will be responsible for implementation, and where funds for mitigation may be sourced. The model for summary table of Mitigation Plan is shown below:

Sub-project phase and activities	Summary of potential impacts	Description of mitigation measures	When and where mitigation measures should be applied	Costs per location		Responsibility		Comments (e.g. Secondary impacts)
				Install	Operate	Supervise	Operate	

Mitigation measures must be monitored to ensure that they are appropriated, functional and successful. The Monitoring Plan should includes monitoring of mitigation measures efficiency by means of its implementation (performance indicators) and environmental indicators (developed during the baseline study), ensuring that the roads causes no adverse impacts to the natural and social environments.

The model for summary table of Monitoring Plan is shown below:

Sub-project phase and activities	What *parameter is to be monitored?*	Where *is to be monitored?*	How *is it to be monitored/ type of monitoring equipment?*	When *is it to be monitored - frequency or continuous?*	Why *is the parameter to be monitored (optional)?*	Cost		Responsibility	
						install	operate	install	operate

Institutional arrangements and budget

The institutional responsibilities should be summarized, training and capacity building elements should be prescribed with indicative cost for implementation.

Consultation

Public and stakeholders consultations should be conducted at least two times. First consultation is required during scoping stage, when outline of the EIA report and major environmental concerns, priorities, preliminary ideas for mitigations and monitoring should be discussed. The second round should be implemented for presentation and discussion of draft EIA report and EMP. Summary of consultations may be presented in the following format.

Location	Objective	Invitees	Participants	Summary conclusions and Comments	Responsibility for action

Conclusion and recommendations

A statement of the environmentally and social acceptability of the sub-project and the viability of proposed alternatives should be prepared, including summary of mitigation measures proposed and other recommendations/conditions necessary to ensure mitigation.