KOCKS CONSULT GMBH

ENVIRONMENTAL IMPACT ASSESSMENT REPORT 01/2009

EUROPEAN UNION

REPUBLIC OF MOLDOVA

FEASIBILITY STUDY FOR THE REHABILITATION AND EXTENSION OF THE ROAD M3 CHISINAU – GIURGIULESTI/ROMANIAN BORDER

Europe Aid/125919/C/SER/MD

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ACRONYMS

AADT	Average annual daily traffic
asl	above sea level
BR	Biosphere Reserve
CAP	Conservation Action Plan
CBD	Convention of Biological Diversity
CITES	Convention on Int.I Trade in Endangered Species of Wild Flora and Fauna
CMS	Convention on Migratory Species of Wild Animals
E	east/eastern
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EIS	Environmental Impact Study
FRG	Federal Republic of Germany
FS	Feasibility Study
FSU	Former Soviet Union
IFI	International Funding Institution
IUCN	International Union for the Conservation of Wildlife
MCA	Millennium Challenge Account
MCC	Millennium Challenge Corporation
MENR	Ministry of Environment and Natural Resources
MCTD	Ministry of Construction and Technical Development (formerly MTRI)
NGO	Non Government Organization
NP	National Park
NR	Nature Reserve
NSPAF	
p.a.	per annum
RAP	Resettlement Action Plan
PA	Protected Areas
p.a.	Per annum
S	south/southern
SEE	State Ecological Expertise
SRA	State Road Administration
t	tons
TEN	Rrans-European Network
TfCA	Trans-Frontier Conservation Area
TRACECA	Transport Corridor Europe Central Asia
ToR	Terms of Reference
W	west/western

WB	World Bank
WWF	World Wildlife Fund for Nature

1. EXECUTIVE SUMMARY

The Government of the Republic of Moldova (GRM) is undertaking road improvement projects with the assistance of various international donors. One such project is the EU sponsored Feasibility Study for the Rehabilitation and Extension of the Road M3 Chisinau-Giurgiulesti/Romanian Border which seeks to improve several sections of the M3 road south of Chisinau to Giurgiulesti. On behalf of the GRM, the project is administered by the Ministry of Construction and Territorial Development and the State Road Administration (SRA).

The overall objective of the project is to support the modernization of Moldova's transport infrastructure in order to improve access to regional and international markets. The specific objective is to provide a bankable technical, financial, environmental and institutional feasibility study for the rehabilitation and extension of the M3 road Chisinau-Giurgiulesti/Romanian Border – 216 km. An Environmental Impact Assessment has been completed in order to meet the required deliverables.

Two main issues in the ToR determine the conduct of the M3 FS and subsequently the conduct of this Environmental Assessment (EA):

First, no particular donor/lender has been identified for the needed improvements on M3. This means that the procedures and guidelines from the various IFI need to be taken into consideration to the extent possible. While the general guidelines of each of the institutions are similar in approach detailed analysis might vary. Therefore a generalized approach was applied to satisfy overarching requirements.

Secondly, individual roadway segments are currently being evaluated in regards to their economic feasibility, based primarily of current and future traffic volumes and estimated cost of the needed improvements. This iterative process will identify specific sections ranked by their need and priority of implementation. Once the particular sections are identified, the impacts of the chosen projects will be analyzed and assessed.

Therefore the EA will be two-phased. First, a corridor-level EA is being carried out, and secondly, once individual projects are identified, a detailed EIA will be conducted for selected sections, taking into consideration scope and extent of the Project as well as its expected environmental impacts.

This EIA report deals with the first phase and consequently covers the M3 corridor as a whole. The second phase, detailed EIA and EMP for selected sections, will vary in scope and extent depending on whether the respective section is an offline scheme (bypass) or an online scheme (online reconstruction or online maintenance).

Since the ultimate International Funding Institution (IFI) for the implementation of the Project or potential sub-projects has not yet been identified, the various environmental and social guidelines have been considered to the extent possible. A series of meetings with the MCC environmental team took place to coordinate the process and study effort. The Consultant's study team, comprising of both Moldovan and international environmental and social experts, carried out the following activities:

- Conduct of several field visits to the study corridor between June and December 2008;
- Review of relevant national environmental legislation and procedures and IFI policies;
- Review of existing baseline data (literature and internet publications);

With regard to the potential environmental impacts and mitigation measures there has to be a differentiation in between the different types of sub-projects. These are:

- Road sections for rehabilitation only
- Road sections for reconstruction inclusive of widening of existing carriageway and
- Road sections that are to be newly built (bypasses and new alignments).

Depending on the type of the respective sub-project and in accordance with national and IFI provisions the level of required environmental assessment is to be determined. This means that for rehabilitation and reconstruction sections in most cases a category B assessment is required whereas for road sections that are to be newly built a category A assessment will be necessary.

As a result of the FS the road sections Comrat to Balabanu (R38) and Balabanu (R38) to Ciumai are proposed for the engineering design and preparation of tender documents. Both sub-projects are reconstruction road sections and as regards there overall environmental impact to be assessed as category B projects. Therefore for these sub-projects it is not necessary to conduct a full scale EIA, but it is necessary that an Environmental Management Plan (EMP) is prepared as part of the design documents.

Out of the numerous options of bypasses and new alignments that were investigated during conduct of the FS only the

- M3 extension and Cimislia bypass and the
- M 3 extension and Comrat bypass
- New Alignment Giurgiulesti – Vulcanesti (marginal)

options turned out to merit further investigation. These newly to be build road sections are to be assessed as category A projects for which the present study recommends separate EIAs to be conducted during the detailed design phase.

In the following potentially occurring environmental impacts as well as mitigation measures are described for 3 different Project stages, i.e. the design, construction and operation stage of the M3 road corridor. Thereby focus is laid on M3 rehabilitation and reconstruction road sections because the new alignment and bypass sections are to be assessed as category A and will therefore require a separate EIA to be conducted.

The design of the Project will generally follow the existing Moldovan SNIP standards. Some local adjustment of these standards should however be taken into consideration during the decision making process to increase the potential bene-

fits of the investment for beneficiaries. Based on the findings from the field trips, baseline analysis, feedback obtained during public consultation and discussions among the study team the following should be taken into consideration:

Existing village passages:	• Provide pedestrian walkways in every village, if possible on either side of the road; • Provide lay byes for buses in both directions
Between neighboring villages and sections with existing accident hot-spots	• Provide paved shoulders for safe accommodation of non-motorized traffic, e.g. between
Potential flood hazards after torrential rains within certain road sections	• Provide state of the art drainage facilities to reduce risk of flooding

Alongside many road sections tree rows, shrubs and avenues are planted. These structures are assessed as significant elements of the landscape. In case of the reconstruction sections the design road is being overlaid to the existing road. For this reason tree losses are put to a minimum.

Impacts and Mitigation measures referring to the construction phase of the Project

In sections where only rehabilitation and upgrading of already existing road sections is proposed within the RoW no major environmental impacts are expected and land acquisition would not be required. In these cases most potential environmental impacts will be limited to the construction phase, such as dust and noise generation, odour nuisance resulting from the use of bitumen, traffic disruption caused by the temporary disposal or transport of construction materials or waste etc. Further issues may be erosion control, labour camp or traffic management. These impacts are common in road rehabilitation works and can be mitigated with existing management techniques. In order to minimize potential off-site impacts, materials (e.g. asphalt, stone, etc.) would be supplied only from sources with approved licenses, permits, and/or approvals for environment and worker safety. Construction equipment used during construction would meet internationally recognized standards for environment and worker health and safety.

Impacts and mitigation measures referring to the operation phase of the Project

After completion, the Project will have positive indirect impacts on human health and safety through decreased number of accidents, reduced air pollution resulting from more constant rates of travel speeds on rehabilitated road sections, cleaning up of solid waste from roadside drains, and reduced water pollution resulting from rehabilitated drainage systems. Residents in the area of influence of the road subprojects will benefit from: (i) a reduction in travel times and in transport costs, (ii) improvements in the quality of road passenger and cargo transport; and, (iii) employment generation.

Scoping meetings and public participation

Recognizing that community involvement is of great importance to understand the nature and extent of potential impacts, especially socio-cultural impacts, and to assess the suitability and acceptability of mitigation measures associated with the Project a series of scoping meetings was conducted. Comments and suggestions received on the Project as far as it is technically and economically feasible will be incorporated into its implementation.

2. INTRODUCTION

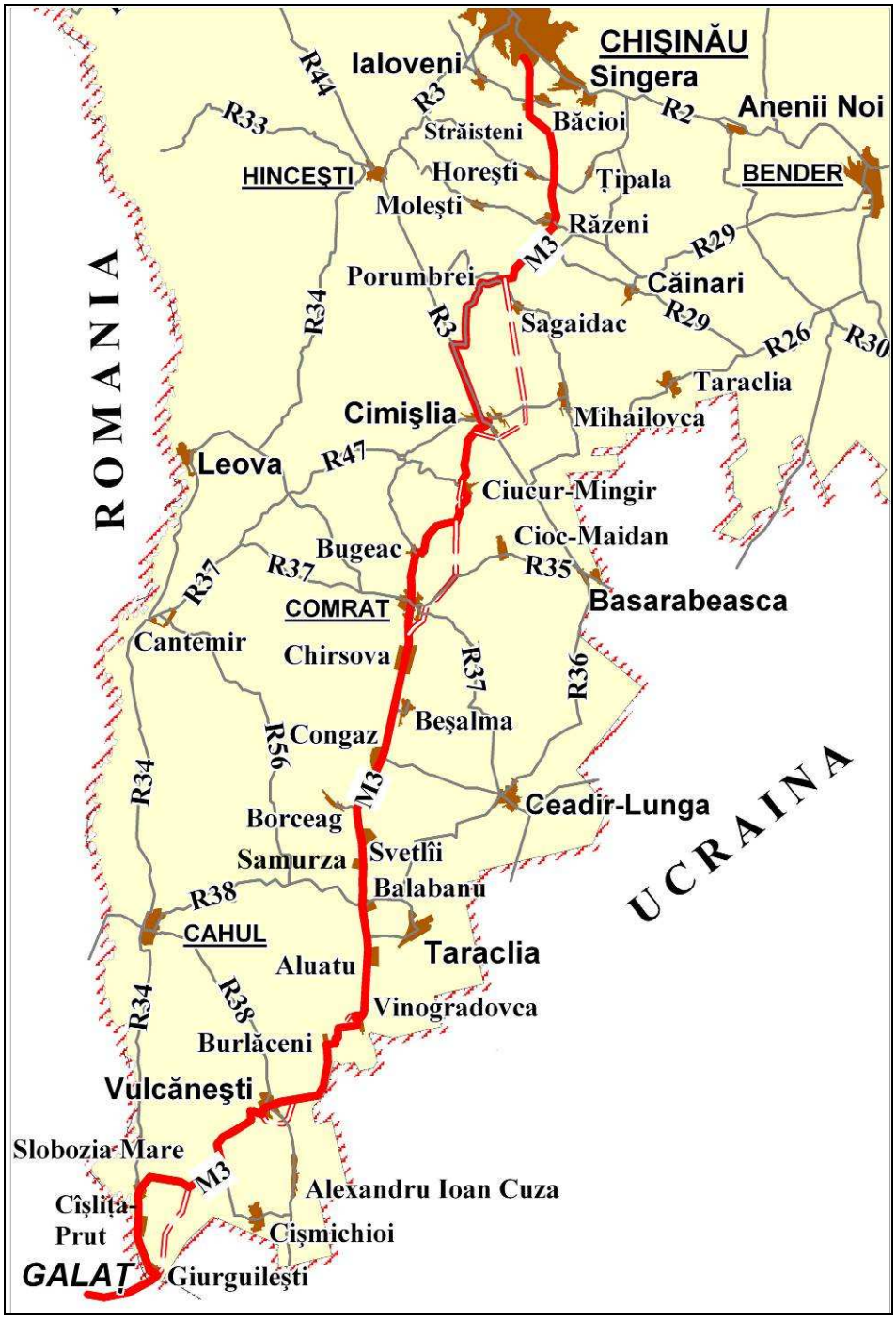
2.1 Project Background

The Moldovan M3 Road provides the most important and shortest link between the capital Chisinau and Giurgiulesti – giving access to the Danube and the Black Sea. In addition, the M3 corridor is an integral part of the European Road E577 Poltava – Kirovograd – Chisinau – Giurgiulesti – Galati – Slobozia and provides a link between Trans-European Network (TEN) corridors IV and IX. Currently, the corridor has, in parts, a high level of deterioration and reduced bearing capacity, resulting in axle load restrictions and the diversion of freight traffic, high transportation cost and subsequently reduced local business opportunities and transit traffic. **Figure 1** overleaf presents an overview of the existing M3 corridor.

The proposed construction and rehabilitation of the ~ 215 km section of the M3 Chisinau-Giurgiulesti ('the Project') will improve transport links between Moldova, Ukraine and other TRACECA countries. The rehabilitation and potential partial realignment of the existing northern, 60 km section of the road (Chisinau-Cimislia) will improve transport connections and substantially decrease transport cost. The improvement of current conditions on the southern 155 km section between Cimislia and Giurgiulesti is also very important as road conditions are poor for current traffic levels. Overall, the Project will facilitate trade, transport, industry and tourism development and strengthen access to agricultural markets in the

region which is considered a prerequisite for securing transportation connections between the country's centre and its southern regions.

Fig. 1: M3 Corridor Overview



Source: The Consultant

The Assignment

With the Contract Agreement for Consultancy Services dated 06 May 2008 the EC Delegation in Moldova appointed Kocks Consult GmbH, Germany, as the leading firm, in association with Universinj SRL, Republic of Moldova as Consultant for the

"EuropeAid/125919/C/SER/MD FEASIBILITY STUDY FOR THE REHABILITATION AND EXTENSION OF THE ROAD M 3 CHISINAU - GIURGIULESTI/ROMANIAN BORDER".

Under this Contract the scope of services comprises:

- Identification of transport and economic characteristics of the project influence area;
- Carrying out traffic counts on each road sub-section and updating of existing traffic pattern;
- Preparation of traffic forecasts in terms of vehicles per day by representative vehicle types;
- Assessment of existing road condition;
- Detailed bridge inspection and identification of bridge bearing capacity;
- Investigation of soils and materials, including pavement thickness, sampling and testing of various layers, location of quarries and borrow pits;
- Preparation of preliminary road, pavement and bridge designs;
- Proposing of possible phasing of the construction works;
- Preparing an environmental impact assessment;
- Preparation of cost estimates, indicating foreign exchange costs, and as a separate item the amount of local taxes and duties;
- Assessing vehicle operating costs using the Highway Design and Maintenance Model;
- Carrying out an economic analysis for each road section based on current traffic volumes, vehicle operating costs, construction and maintenance cost to provide an estimated Internal Economic Rate of Return, Net Present Value and appropriate analyses;
- Evaluation of economic benefits of each road segment with and without improvement;

- Undertake sensitivity analysis to test the economic results against possible and likely changes in key variables, that may include the growth rate for forecast traffic, construction costs, implementation delays, and vehicle operating costs;
- Identify 1 to 2 roadway sections for engineering design
- Preparation of Detailed Drawings;
- Preparation of Tender Documents for Priority Sections.

Study Objective

The overall study objective, as identified in the Terms of Reference (ToR), is "… to provide a bankable technical, financial, environmental and institutional feasibility study for the rehabilitation and extension of the M3 road Chisinau-Giurgiulesti / Romanian Border in order to identify economically suitable sections for road improvement." The study shall be suitable for presentation to IFIs to attract financing of the road improvement in order to prepare loans by IFIs. These loans will allow the Republic of Moldova to catch up with its backlog in road maintenance and to cope with growing local, international and transit traffic.

General Study Approach

The FS will provide preliminary engineering design, traffic forecasting, and economic evaluation data for the project road sections. The main approach is to make maximum use of the existing road, rehabilitated to an acceptable level using modern geometrical and physical standards. New sections of road shall be considered only where it can be demonstrated that the rehabilitation of the existing road does not provide sufficient benefits to the area and local population; or does not sufficiently improve any negative environmental impact to an acceptable level.

Two main issues in the ToR determine the conduct of the M3 FS and subsequently the conduct of this Environmental Assessment (EA):

First, no particular donor/lender has been identified for the needed improvements on M3. This means that the procedures and guidelines from the various IFI need to be taken into consideration to the extent possible. While the general guidelines of each of the institutions are similar in approach detailed analysis might vary.

Therefore a generalized approach will be applied to satisfy overarching requirements.

Secondly, individual roadway segments are currently being evaluated in regards to their economic feasibility, based primarily of current and future traffic volumes and estimated cost of the needed improvements. This iterative process will identify specific sections ranked by their need and priority of implementation. Once the particular sections are identified, the impacts of the chosen projects will be analyzed and assessed.

Therefore the EA will be two-phased. First, a corridor-level EA is being carried out, and secondly, once individual projects are identified, a detailed EIA will be conducted for selected sections, taking into consideration scope and extent of the Project as well as its expected environmental impacts.

This EIA report deals with the first phase and consequently covers the M3 corridor as a whole. The second phase, detailed EIA and EMP for selected sections, will vary in scope and extent depending on whether the respective section is an offline scheme (bypass) or an online scheme (online reconstruction or online maintenance).

As the bypass sections are predominantly in private ownership a lengthy land acquisition process is required. In addition and in difference to the online schemes (online reconstruction and online maintenance) bypass options are in most cases to be categorized as category A projects according to the provisions of IFIs. Therefore separate EIA studies are required for certain bypass options. One of the offline schemes requiring a separate EIA study inclusive of an EMP is the M3 extension and Cimislia bypass option.

Within the time frame and scope of this budget the two sections: 1. Comrat to Balabanu (R38) and 2. Balabanu (R38) to Ciumai are proposed for the engineering design and preparation of tender documents. For these two online reconstruction schemes an EMP will have to be prepared as part of the design documents. This EMP will also have to be incorporated into the tender documents.

2.2 Objective and Scope of the Environmental Assessment

Given the situation outlined under the section 'General Study Approach' the present EA has been conducted in phases with different respective objectives and scope:

Project Categorization

The first step within the EA process is the determination of the level of environmental assessment required in accordance with national and IFI requirements:

- A 'Category A' would be assigned to such sections where 'significant' impacts may be expected and alternatives (e.g. different alignments for proposed bypasses and the 'non-project option') are considered.
- A Category B would be assigned to sections where no significant impacts are expected (this refers mainly to the online schemes (online reconstruction and online rehabilitation).

The categorization would either trigger that only an Environmental Management Plan (EMP) is to be prepared (category B projects) or that an Environmental Impact Assessment (EIA) inclusive of an EMP (category A projects) is to be conducted for defined sections of the overall Project corridor.

EMPs for Rehabilitation Reconstruction-Only Sections

For sections where only rehabilitation or reconstruction are proposed within the existing RoW and where where the proposed interventions would not affect environmentally sensitive locations or areas, environmental impacts are not expected to be significant and can generally be managed by proper construction management and appropriate, best practice in construction. Such measures would be compiled in an EMP to subsequently become binding elements of the contract documents.

Potential Off-Line Improvements

Where new bypasses are suggested based on economic and environmental considerations or where the proposed interventions would potentially affect environmentally sensitive locations (e. g. protected areas, habitats of endangered spe-

cies etc.) or where significant socio-economic impacts may occur an EIA would be conducted for the respective sub section including the assessment of options and preparation of EMPs.

2.3 Approach and Methodology

Since the ultimate International Funding Institution (IFI) for the implementation of the Project or potential sub-projects has not yet been identified, the various environmental and social guidelines have been considered to the extent possible. A series of meetings with the MCC environmental team took place to coordinate the process and study effort. The Consultant's study team, comprising of both Moldovan and international environmental and social experts, carried out the following activities:

- Conduct of several field visits to the study corridor between June and December 2008;
- Review of relevant national environmental legislation and procedures and IFI policies;
- Review of existing baseline data (literature and internet publications);

Study coordination has been an on-going process, including various individual or group meetings with Project stakeholders, e.g.:

- Rep. of Moldova State Road Administration;
- Ministry of Construction and Territorial Development;
- International Financial Institutions (WB, EBRD);
- Millennium Challenge Account (MCA) Moldova;
- Millennium Challenge Corporation (MCC) Delegation;
- Danube Logistics;
- Steering Committee Meeting;
- and others.

Coordination with MCC and the local MCA continued throughout the study[1]. Scoping meetings were organized at 3 strategic locations in coordination with the

[1] Note: While National Transport Strategy projects are currently funded or underway, the MCC is in the process of finalizing a compact agreement with the Government of Moldova. In preparation of the compact agreement MCC has selected five corridors from the National Transport Strategy for po-

local and state administration and the active support of the Ministry of Construction and Territorial Development. In total 93 elected officials, citizens, stakeholders and NGO representatives participated in these meetings.

More detail on these meetings is provided in Appendix 1.

tential funding. The section of M3 from Cimislia to Giurgiulesti is one of the candidate projects identified by MCC for funding.

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 National Environmental Policy

The foundation of the environmental policy of the Republic of Moldova was laid by the *Law on Environmental Protection* (1993, amended in 1997), *the Law on Environmental Expertise and Environmental Impact Assessment (1996), the Concept of New Environmental Policy of the Republic of Moldova (2001)*, *the National Program on Securing of Ecological Safety and Action Plan (2003)* and *the EU-Moldova Action Plan (2005).* By 2003, Moldova signed 17 international agreements and ratified 15, adopted 25 laws and approved more than 50 regulations, instructions etc., which also form the normative framework for environmental protection.

The *Concept of New Environmental Policy of the Republic of Moldova* (2001), substituted the action plans and the concepts that were used until the mid 90's. This policy paper tries to adjust the main objectives of the national environmental policy taking the social and economic changes in the country and also recent regional and global trends into account. Another key-document is the *EU-Moldova Action Plan (2005)* which addresses sustainable development and proposes measures to be taken to better integrate the environmental dimension into the policies of other sectors. Transport is being given particular attention in this context. The *Strategy for Economic Growth and Poverty Reduction (2003-2007)* also contains a chapter on environmental protection and the sustainable use of the natural resources, emphasizing the need to integrate these principles into all sectors of socio-economic activities.

3.2 National Environmental Legislation and Institutional Framework

The following summary on the Environmental Assessment Procedures of Moldova and related institutional aspects has been extracted from the Sectoral Environmental Assessment carried out in 2007 under the Moldova Road Sector Program Support Project[2].

[2] Moldova Road Sector Programme Support Project: Sectoral Environmental Assessment. Ministry of Road Transport and Road Industry; State Road Administration. Chisinau, February 2007

3.2.1 National Environmental Assessment Procedures

Moldova has its own relatively well-developed legal and institutional framework for Environmental Assessment. This framework is in line with the existing WB EA rules and procedures as well as with the EU EIA Directives. The national legal basis for Environmental assessment is presented in two main laws: *Law on Environmental Protection* (1993) and the *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 national 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 SEE are contained in the Guidelines on Performing SEE (2002). They define, in detail, the goals, objectives, and principles of the SEE, and specify the procedures for submitting project documentation, as well as reviewing procedures.

According to the applicable national legislation the Project documents must describe and assess the expected direct/indirect impacts of the proposed project, in particular for such proposed projects that may impact on air quality, surface water and soils, on the integrity and stability of ecosystems and on people and settlements. The EIA/SEE documents also need to include:

- A comparison of alternatives and justification for the selected alternative,
- Mitigation measures to avoid or minimize impacts to acceptable levels.

Generally, the Impact Assessment needs to address both the construction and operational phase of the project.

For the road sector, the Ministry of Transport and Roads Industry (MTRI) has issued specific "Guidelines Concerning Environmental Protection for Road and Bridges Design, Construction, Rehabilitation and Maintenance Activities" in 1997,

which define environmental requirements for designing, constructing and maintaining different types of roads and bridges in Moldova. This document also contains relevant provisions and standards with regard to traffic noise. In recent practice traffic noise issues are not being consistently followed up. For the present Project however, compliance of proposed solutions with these traffic noise regulations will definitely have to be considered in the decision making process.

Further national pieces of legislation that are relevant in the context of the EIA process are: the Water Code (1993, amended in 2003), the Land Code (1991 as revised), the Forest Code (1996), the Law on Air Protection (1997), the Law on Regime of Harmful Products and Substances (1997, amended in 2002), the Law on Wastes of Production and Consumption (1997), the Law on Payment for Pollution of the Environment (1998), the Law on Sanitary-Epidemiological Protection of the Population (1993, as amended), the Regulation on Access to Information, Public Participation in decision making and Access to Justice in Environmental Matters (2000). More details about each of these pieces of legislation is provided in Appendix 1.

3.2.2 International Environmental Conventions

A catalogue with a comprehensive list of environmental legislation of the Republic of Moldova has been published in 2008. Besides the national environmental legislation this list also indicates the 27 International Environmental Conventions that Moldova is a party to. Of these the following have been considered in the organization of the EIA process for the M3 Project or considered in the assessment of potential impacts or the design of mitigation measures.

- The Espoo Convention on Environmental Impact Assessment in a Transboundary Context;
- The Aarhus Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters;
- The Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat; and
- The Bonn Convention on the Conservation of Migratory Species of Wild Animals.

3.2.3 Institutional Aspects

The national authority responsible for SEE in Moldova is the Division on SEE within the State Ecological Inspectorate (IES), which is a subdivision of the Ministry of Ecology and Natural Resources (MENR)[3]. The earlier mentioned Sector Assessment of 2007 concluded that these institutions do have relevant capacities to perform their duties in reviewing EA studies and enforcing EMP provisions. However, the Ministry of Construction and Technical Development (MCTD, formerly MTRI) and the State Road Administration (SRA) have no special unit and/or especially designated staff responsible for environmental issues in the road sector, nor are there appropriate laboratories that may assist in ensuring compliance with the applicable legislation, regulations and ecological norms. The Sector Assessment thus concluded that TA would need to be provided to the MCTD 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. With support of MCC and as a first step into that direction an environmental consultant has been recently appointed to the SRA.

Other governmental institutions that will be involved in the EIA process of the Project and its future sub-projects are:

i) The Ministry of Economy and Commerce;
ii) The Ministry of Construction and Territorial Development.
iii) The Ministry of Agriculture and Food Industry
iv) The Agency “Apele Moldovei”.
v) Local public Administration
vi) Architecture Service
vii) Territorial Ecological Agencies

[3] The IES has a special division in charge for performing SEE. For major projects (i.e. projects exceeding investment of 1 Mio Lei) it is the responsibility of the MENR’s Institute of Ecology and Geography to perform the SEE.

3.3 IFI-Environmental Policies

3.3.1 European Bank for Reconstruction and Development – Environmental and Social Policy

The European Bank for Reconstruction and Development (EBRD) financed projects are expected to meet good international practice related to sustainable development. To help clients and/or their projects achieve this, the Bank has defined specific Performance Requirements (PRs) for key areas of environmental and social issues and impacts as follows:

- PR1 – Environmental and Social Appraisal and Management
- PR2 – Labor and Working Conditions
- PR3 – Pollution Prevention and Abatement
- PR4 – Community Health, Safety and Security
- PR5 – Involuntary Resettlement and Displacement
- PR6 – Biodiversity Conservation and Sustainable Natural Resources Management
- PR7 – Indigenous People
- PR8 – Cultural Heritage
- PR9 – Financial Intermediaries
- PR10 – Information Disclosure and Stakeholder Engagement

PRs 1 through 8 and 10 include the requirements for direct investment operations; PR2 and PR9 those for financial intermediary operations. Each PR defines, in its objectives, the desired outcomes. Compliances with relevant national laws are integral parts of the PRs.

Categorization of projects by EBRD will depend on the nature and extent of any actual or potential adverse environmental or social impacts as determined by the specifics of the project design, operation and location. EBRD Environmental and Social Policy lists samples of projects which could be considered Category A. Examples and descriptions indicated in the EBRD Policy which may be applicable to the Project are:

- Construction of motorways, express roads and lines for long distance railway traffic; airports with a basic runway of 2,100 meters or more; new roads of four or more lanes, or realignment and/or widening of existing roads to provide four or more lanes, where such new roads, or realigned and/or widened sections of road would be 10 km or more in a continuous length;
- Projects which are planned to be carried out in sensitive locations or are likely to have a perceptible impacts on such locations, even if the project category does not appear in the EBRD list. Such sensitive locations include, inter alia, national parks and other protected areas identified by national or international law, and other sensitive locations of international, national or regional importance, such as wetlands, forests with high biodiversity value, areas of archaeological or cultural significance, and areas of importance for indigenous peoples or other vulnerable groups;
- Projects which may result in significant adverse social impacts to local communities or other project affected parties;
- Projects which may involve significant involuntary resettlement or economic displacement.

3.3.2 World Bank Safeguard Policies

WB has a series of safeguards policies and procedures that address different issues. WB safeguards policies that may be triggered by the current Project are the following: (a) Environmental Assessment (OP 4.01), (b) Natural Habitats (4.04), and (c) Involuntary Resettlement (OP4.12). At current stage only policy related to the Environmental and Social Assessments (OP4.01 and OP4.12) are considered to be applicable, however, as a project is implemented, other policies may be potentially triggered, as well.

Environmental 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, siting, 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. Generally, the Bank favours 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 trans-boundary 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 these are identified during EA.

WB OP 4.12 on Involuntary Resettlement - The requirement of the World Bank's Policy (WB OP4.12) is to avoid involuntary resettlement whenever possible. The details of this specific Policy are presented in the Social Impact Assessment Report prepared as an integral part of this FS.

Information Disclosure and Consultation - For (i) A and B projects and (ii) subprojects 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 and social screening 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.

Where in accordance with World Bank Safeguard Policies (OP/BP/GP 4.01 Environmental Assessment) a project is rated environmental Category B (limited and reversible environmental impact) 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.

3.3.3 Millennium Challenge Corporation – Guidelines for Environment and Social Assessment

The Millennium Challenge Corporation (MCC) is cognizant of the fact that pursuit of sustainable economic growth is highly associated to a healthy environment. Accordingly, to ensure that MCC funded programs are environmentally sound, compliance with certain regulatory requirements and policies promulgated is required. The guidelines provide the principles of EIA by which the Compact eligible countries are expected to apply. The application of these guidelines to specific projects and the scope of environmental and social impact review depend on the nature, scale and potential environmental and social impacts of proposed projects. As part of its review of Compact proposals, MCC funding decisions will be informed by the results of environmental screening and where needed, an Environmental Impact Assessment or other environmental and social impact analysis. Screening will result into project categorization based on scope and magnitude of impacts. Projects which are deemed to have significant adverse environmental and social impacts, considered to be sensitive, diverse and unprecedented are

classified as Category A and will be subject of a full EIA based on the guidelines. Project classified as Category B (less adverse impacts than A) will require specific environmental and social analysis including an Environmental Management Plan (EMP). Category C projects on the other hand are considered unlikely to have adverse environmental and social impacts but where MCC reserves the right to require specific impact studies as the case maybe.

3.4 Land Acquisition and Resettlement Policy

The details of relevant land acquisition and resettlement policy are provided in the Social Assessment Report.

4. DESCRIPTION OF THE PROPOSED PROJECT

4.1 Introduction

The M3 feasibility study (FS) will provide preliminary engineering design, traffic forecasting, and economic evaluation data for the project road sections. The main approach is to make maximum use of the existing road, rehabilitated to an acceptable level using modern geometrical and physical standards. New sections of road shall be considered only where it can be demonstrated that the rehabilitation of the existing road does not provide sufficient benefits to the area and local population; or does not sufficiently improve any negative environmental impact to an acceptable level.

4.2 Corridor Description

The M3 corridor, presented in **Figure 1**, connects Chisinau, the Capital of Moldova, with Giurgiulesti in the very south of Moldova over a distance of approximately 216 km and can be subdivided in 7 major sections:

1. Chisinau – Porumbrei (km 34)
The corridor starts in Chisinau as a concrete four lane Category I motorway up to the village of Sagaidac and extends from there on two lanes to the village of Porumbrei. From here on south, an extension of M3 was designed to bypass the Town of Cimislia. Design, land acquisition as well as earthworks have been started in the period from 1985 to 1995. Rights for land acquisition might have expired since then.

2. Porumbrei - R 3 (14 km)

Because the Cimislia bypass is not completed, the corridor continues from Porumbrei on in south-western direction on local roads, as a Category IV roadway, to connect with Republican Road R3. The Porumbrei to R 3 section was never planned to form an integral part of the M 3 corridor, but due to the stoppage of works on the Porumbrei – Cimislia Section the corridor is actually leading through the villages Porumbrei, Iurievca and Gradiste. The section has a load restriction which is often not observed but the alternative route via Hincesti to Chisinau is much longer and thus transport cost is higher.

3. R 3 – Cimislia (12 km)

The M3 corridor then follows the R3 alignment to Cimislia. The section of R3 between Hincesti and Cimislia will be rehabilitated by the end of 2009.

4. Cimislia – Comrat (32 km)

From Cimislia onward the corridor (Category III) continues as M3 south to the town of Comrat (sharing the E 577 designation). Comrat is the capital of the autonomous Gagauzia region. Here, M3 intersects with R 37 which leads west to Cantemir and R 35 east to Basarabeasca. The section will be rehabilitated by the end of 2008.

5. Comrat -Ciumai (60 km)

From Comrat south the M3 continues as a Category II/III road – connecting the villages of Chirsova and Congaz to the intersection with R38. Regional Road 38 provides access westward to the City of Cahul with a border crossing to Romania and eastward to the town of Taraclia.

6. Ciumai – Vulcaneşti (16 km)

From the intersection with R 38 the M3 continues south to the village of Ciumai. In order to avoid a double crossing of the Ukrainian Border the corridor follows a local road in a south-western direction to reconnect with the M3 7 km east of the town of Vulcanesti. The “Bolgrad – Bypass” (Ukraine) is 15.5 km in length and a

result of the break up of the Soviet Union. The original M3 Road passed through Bolgrad – now part of the independent Ukraine – so an alternative route entirely within Moldova was created at low cost and over a limited time period. The carriageway is extremely narrow with sharp (90°) curve s and is highly unsuitable for heavy truck traffic.

7. Vulcaneşti - Giurgiuleşti (40 km)

From Vulcanesti on the corridor (as Category IV) follows the M3 alignment for 14 km to an intersection with a local road. Here the corridor turns westward to intersect with R34 in the village of Slobozia Mare. Following R34 south the study corridor ends in the village of Giurgiuleşti. Giurgiuleşti is located between a border crossing over the Prut River to Romania in the west and a border crossing with the Ukraine to the east. The southern sections from Vulcanesti to the Danube river which are classified as category IV have a maximum axle load of 8 tons.

In total, the Project road passes through 27 settlements.

4.3 General Project Layout

Road rehabilitation will generally follow the existing alignment to minimize extensive excavation and to avoid realignment in difficult sections and land acquisition in urban and agricultural areas. The proposed carriageway and shoulder width are shown in **Table 1** below. However, there will be sections where pavement and shoulders will be narrower depending on the local conditions. **Table 2** presents applicable SNIP design parameters.

Tab. 1: Existing and Proposed M 3 Segment Classification

	Existing		Proposed				
Section	Length (km)	Present Road Cat.	Design Speed (1) (km/h)	Paved Roadway Width (2) (m)	Gravel Shoulder Width (3) (m)	Minimum Horizontal Curves (4) (m)	Max. Grade (%)
Chişinău- Porumbrei	34	I	80-100	15.0	3.0	400	6,0
Porumbrei- R 3 (5)	14	IV	30-60-80	8,0	1,0	30	7,0
R 3 – Cimişlia	12	III	60-100	8.0	1,0	150	1,5
Cimişlia -Comrat	32	III	60-100	8.0	1,0	60	7,0
Comrat -Ciumai	60	III	60-100	8.0	1,0	200	3,0
Ciumai – Vulcaneşti	16	IV	60-80	8.0	0,5	60-100	7,0
Vulcaneşti - Giurgiuleşti	40	IV	60-80	8.0	0,5	40	7,0

Notes: (1) Maximum speed pertains to normal terrain, minimum to difficult terrain
(2) Including width of paved shoulder
(3) In difficult terrain the shoulder width can be reduced to 1.0 m
(4) The minimum radius for serpentines is 20 m
(5) On an existent section of 400m the maximum grade reaches 10,5%

Tab. 2: Geometrical Design Standard SNIP Categories

Road category	Design Speed (km/h)			No. of lanes	Lane width	Carriage-way	Width of Shoulder		Width of Median		Total Road
	normal	rolling terrain	difficult terrain		(m)	(m)	total (m)	paved (m)	total (m)	paved (m)	Width (m)
I-a	150	120	80	4, 6 or 8	3.75	2 x 7.50 or 2 x 11.25 or 2 x 15.00	3.75	0.75	6.00	1.00	28.50 or 38.00 or 43.50
I-b	120	100	60	4, 6 or 8	3.75	2 x 7.50 or 2 x 11.25 or 2 x 15.00	3.75	0.75	5.00	1.00	27.50 or 35.00 or 42.50
II	120	100	60	2	3.75	7.50	3.75	0.75	-	-	15.00
III	100	80	50	2	3.50	7.00	2.50	0.50	-	-	12.00
IV	80	60	40	2	3.00	6.00	2.00	0.50	-	-	10.00
V	60	40	30	1	-	4.50	1.75	-	-	-	8.00

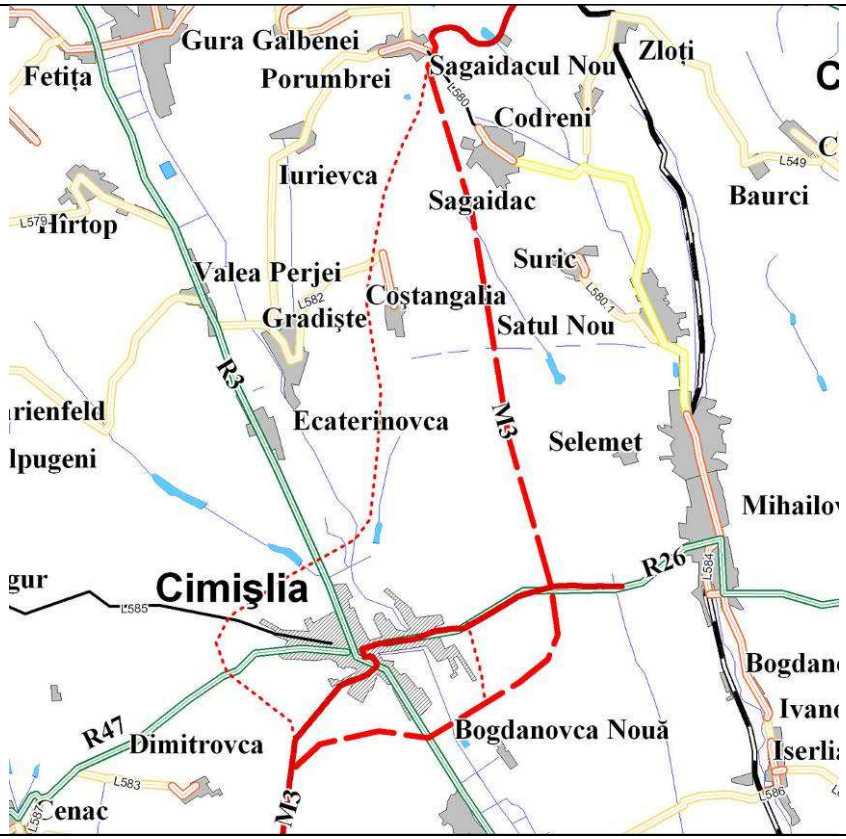
Source: SNIP 2.05.02-85, 1986

4.4 Alignment Options

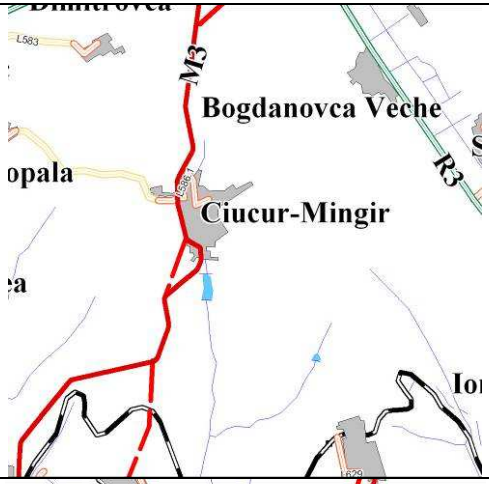
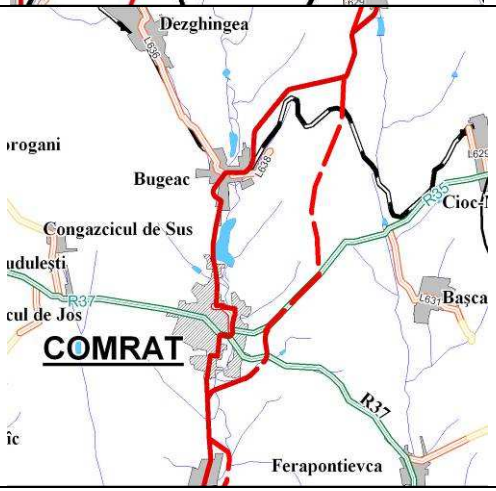
Several planning efforts have been undertaken over previous decades and various alignment options have been identified for the M3 corridor. During periods of higher traffic volumes several bypass options were identified. See list below. Table 3 presents the identified alignment options together with schematic location maps.

- M3 extension (19.0 km)
- Cimislia Bypass (14.3 km)
- Realignment Ciucur-Minjir (2.1 km)
- M3 extension and Comrat Bypass (17.9 km)
- Bypass Chirsova (6.7 km)
- Bypass Congaz (6.4 km)
- Bypass Svetliî (3.6 km)
- New alignment and bypass Ciumai – Burlaceni (15.0 km)
- Bypass Vulcăneşti (8.4 km)
- Bypasses of Slobozia Mare, Cişlița-Prut, Giurgiuleşti (20.7 km)

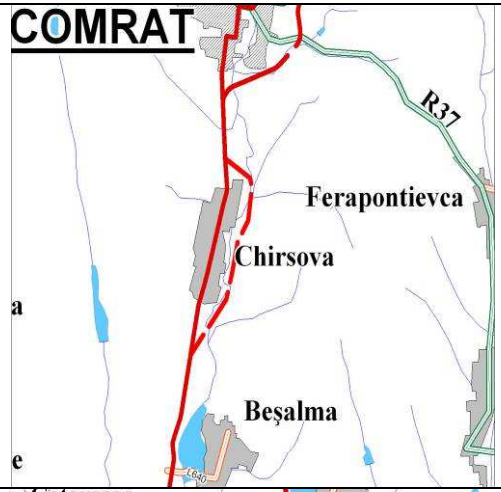
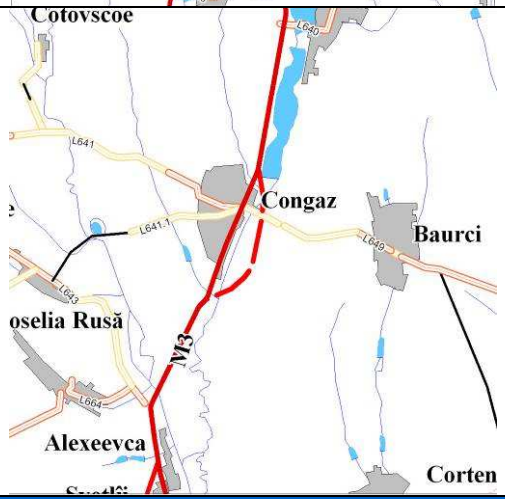
Tab. 3: Planned M3 Extensions and Bypasses – M3 Extension and Cimislia bypass

No	City Town	Length	Status	
1	2	3	4	5
1	Porumbrei-Cimislia from km 34 until km 53+200 (intersection with R26 road)	19 km	The M3 Cimislia extension and bypass was developed as one technical project. For the section, km 34 to km 40, detailed design was developed in 1989. The design was partially carried out with alignment works, bridges and culverts. For the section from km 40 to km 53 land was acquired in 1990. However construction stopped and land acquisition rights expired. The land is still in public ownership.	
2	Bypass of Cimislia town	14 km .	Preliminary location studies were developed in 1991-92 in coordination with the local public administration. Other bypass alternatives of Cimislia bypass were developed.	

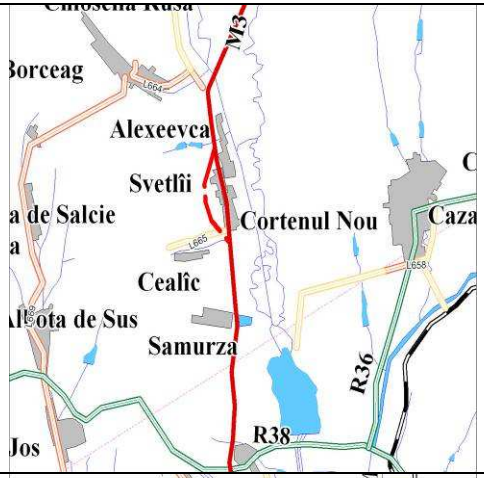
Tab. 4: Planned M3 Extensions and Bypasses – Ciucur Minjir & Comrat Bypass

No	City Town	Length	Status	
3	Ciucur-Minjir Bypass	2.1km	A detailed design was developed in 1990 for the Ciucur – Minjir bypass. At the moment the existing road through the village is rehabilitated under another recent project.	
4	Comrat By-pass	17.9 km	Two bypass sections were developed: The first of the sections started in 1988, with initial construction of 9.0 km, but only approximately 4.0 km were finalized.	

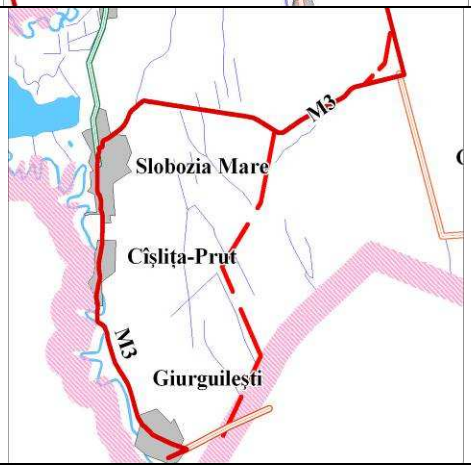
Tab. 5: Planned M3 Extensions and Bypasses – Chirsova & Congaz

No	City Town	Length	Status	
5	Chirsova By-pass	6.7 km	In 1992 bypass location studies were carried out for the Chirsova bypass with public local administration coordination and agreement.	
6	Congaz By-pass	6.4 km	In 1992 bypass location studies were carried out, with public local administration coordination and agreement.	

Tab. 6: Planned M3 Extensions and Bypasses – Svetlii & Burlaceni

No	City Town	Length	Status	
7	Svetliî Bypass	3.6 km	In 1992 bypass location studies were carried out, with public local administration coordination and agreement.	
8	Ciumai – Burlaceni Bypass	15.0 km	In 1997 a detailed design was developed for rehabilitation of the road section from Ciumai village to the intersection with the Vulcanesti-Bolgrad Road. The project was not implemented and requires re-examination and updating.	

Tab. 7: Planned M3 Extensions and Bypasses – Vulcanesti & Giurgiuleşti bypass

No	City Town	Length	Status	
9	Vulcăneşti Bypass	2.7 km	In 1989 a detailed design was developed for the first section of the Vulcanesti town bypass which was partially constructed.	
10	Slobozia Mare, Câşliţa Prut, Giurgiuleşti villages bypass	20.7 km	In 1994, a Feasibility Study for the bypass of Slobozia Mare, Câşliţa Prut, Giurgiuleşti villages was developed. In 1997 the Design Institute for territorial organization elaborated the documents for land acquisition and coordination for Government approval. The works stopped, and the project needs to be updated.	

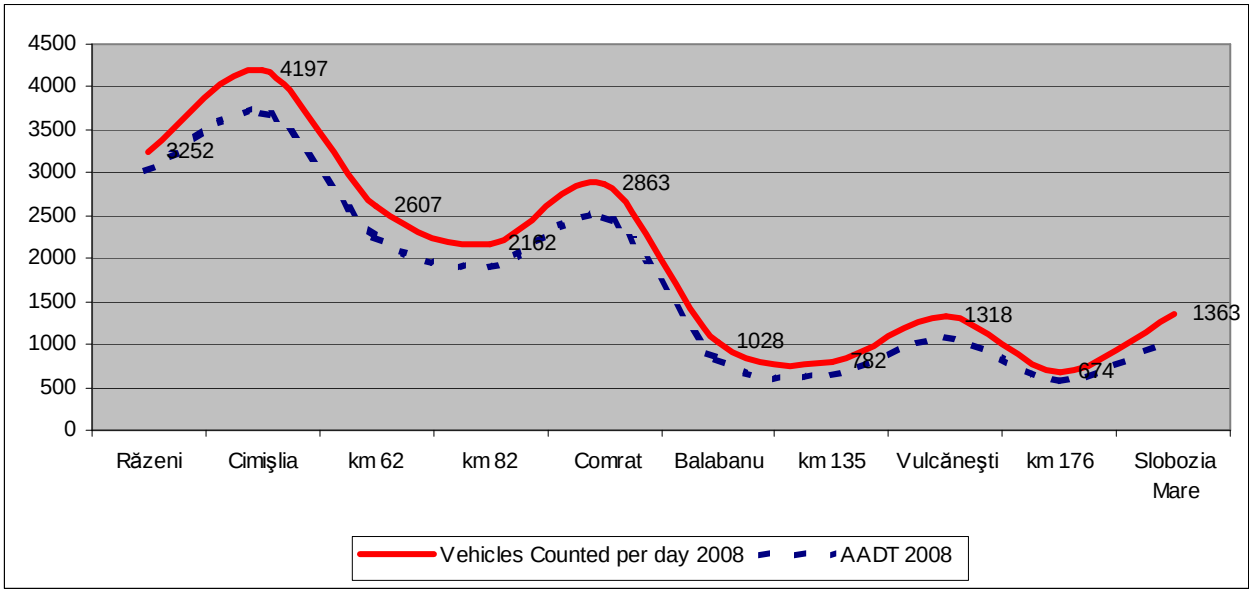
4.5 Economic and Social Need for the Project

The construction and rehabilitation of the road M3 Chisinau-Giurgiulesti will improve transport links between Moldova, Ukraine and other TRACECA countries. The rehabilitation and partial realignment of the first three sections (60 km) of the road (Chisinau-Cimislia) will improve transport connections avoiding inhabited areas and substantially decrease transport costs. The rehabilitation of the second (existing) part (sections 4 – 7, 156 km) of the road Cimislia-Giurgiuleşti is very important since road conditions are poor for current traffic levels. In addition, M3 will connect the Giurgiulesti Free Port (currently under development) with the central regions of Moldova. The rehabilitation and reconstruction of the whole road will facilitate trade, transport, industry and tourism development and strengthen access to agricultural markets in the region and will be a prerequisite for securing transportation connections between the country's centre and its southern regions.

4.6 Existing Traffic Volumes and Forecasts

After the analysis of existing earlier traffic counts, new traffic surveys were conducted late July through the end of August 2008. The survey programme consisted of Manual Classification Counts (MCC), a Turning Movement Count (TMC), and Origin-Destination Surveys (O-D). **Figure 2** presents the traffic distribution along the study corridor. The first obvious trend on this corridor is the decline of traffic volume from north to south, and secondly traffic peaks occur in the major localities along the study corridor - Cimislia, Comrat, Vulcanesti, and Slobozia-Mare/Giurgiulesti.

Fig. 2: Study Corridor Traffic Distribution



Source: Consultant's surveys

4.7 Traffic Forecasts

Traffic forecasts for a 20 year period were made on the basis of available data, including:

- existing time series traffic count data;
- available study reports such as the study in preparation of the National Transport Strategy;
- statistical data published in the Statistical Yearbook of Moldova;
- past and predicted GDP figures from World Bank, EBRD and International Monetary Fund;
- recent traffic counts and OD survey results carried out on the study corridor.

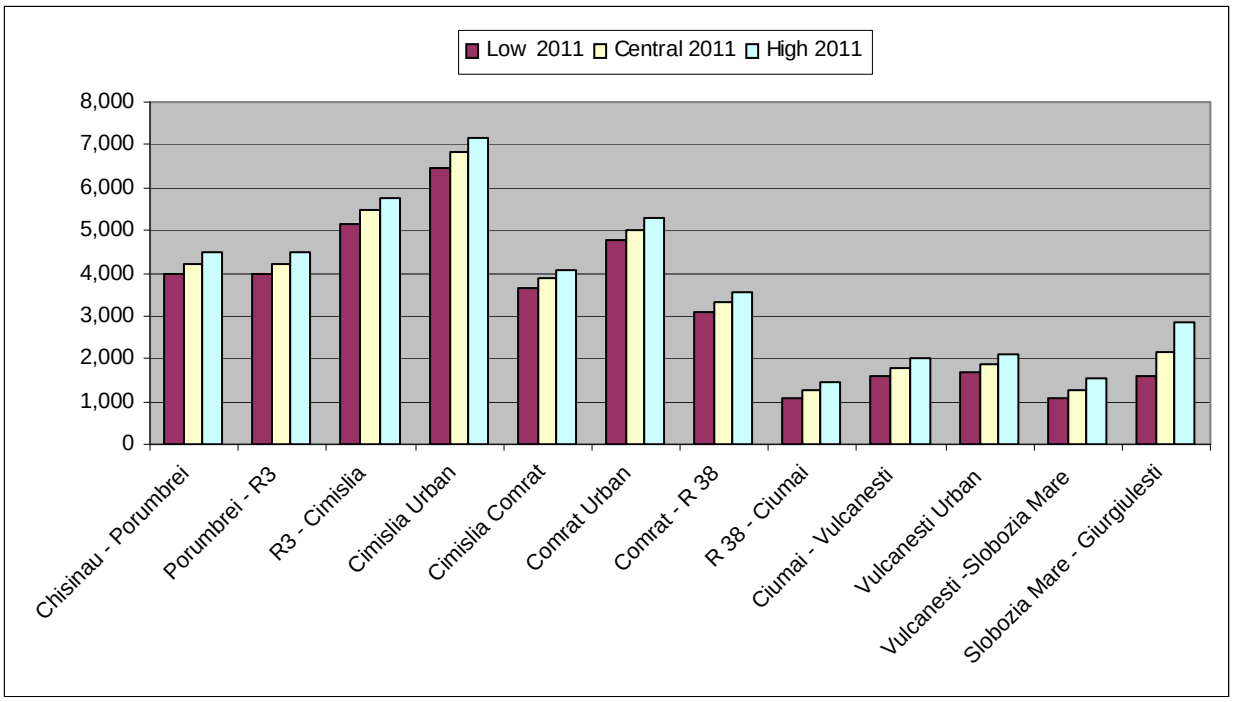
There are four main components of future traffic growth in the M3 corridor:

- "normal" traffic growth, deriving from national and regional economic development

- "diverted" traffic from alternative routes and corridors following rehabilitation and / or upgrading of the M3
- "generated" traffic resulting from local and regional improvements in accessibility
- traffic generated by the development of Giurgiulesti Freeport

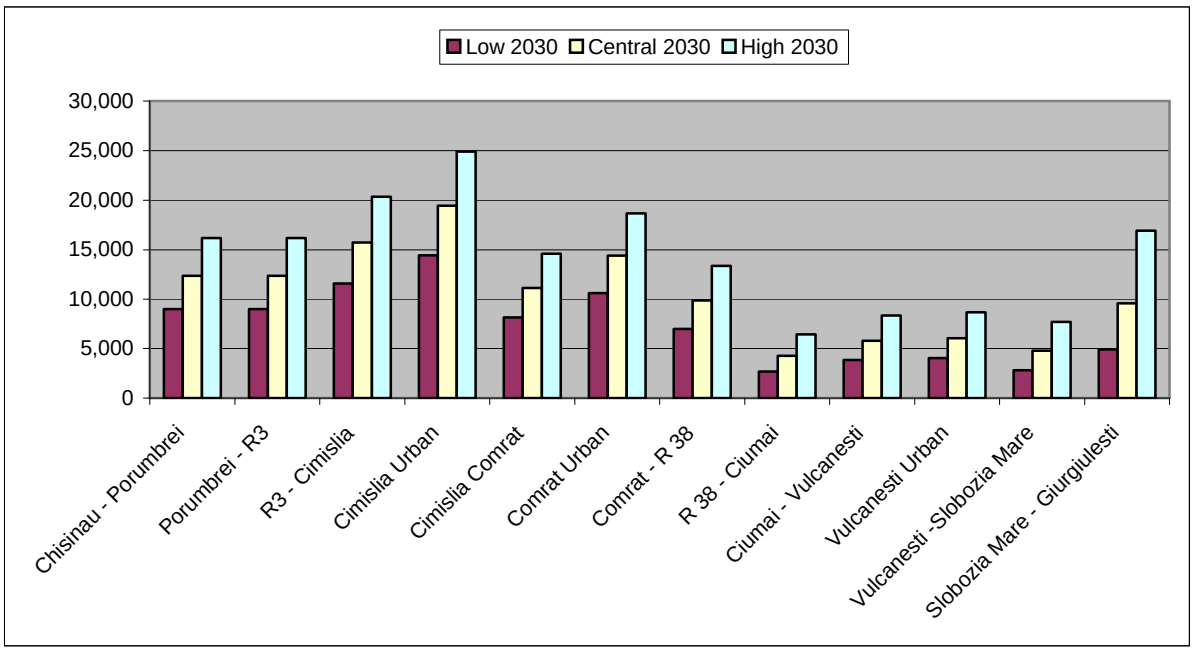
The traffic forecasts have taken each of these four components into account to produce future flows for each of the traffic sections, taking cognisance of the particular characteristics pertinent to each section. It has been assumed that the date of opening of the improved/rehabilitated road corridor will be the beginning of year 2011. The forecasts cover the period 2008 – 2030, respectively representing the traffic survey base year and the twentieth operational year following implementation of the project. **Figure 3** presents the 2011 forecast by individual corridor sections, **Figure 4** illustrates forecasted traffic volumes by 2030. (Details of the traffic forecast methodology and calculations can be found in the M3 FS documentation Chapter 3).

Fig. 3: 2011 Traffic Forecast (AADT)



Source: The Consultant

Fig. 4: 2030 Traffic Forecast (AADT)



Source: The Consultant

4.8 On-site Works

As had been recommended in the Terms of Reference for the Project, the road rehabilitation will generally follow the existing alignment to minimize extensive excavation and avoid realignment in difficult sections and land acquisition in urban areas and agricultural areas. The proposed carriageway and shoulder width are shown in Chapter 4.3. However, there will be sections where pavement and shoulders will be narrower depending on local conditions. As part of the improvement works the following types of interventions are envisaged:

- Rehabilitation and widening of some existing road sections;
- Resurfacing or rehabilitation of existing bitumen and concrete surfaced roads;

- Upgrading of some existing sections to Category II standard or construction of new alignments, including bridges.

The proposed rehabilitation and construction works will involve the following activities:

- General activities (survey/preliminary works)
- Establishment and operation of work camps, equipment mobilization and operation, contractors yard and potentially crushing plants;
- Site Clearance;
- Earth works;
- Establishment of quarries and borrow pits;
- Stockpiling and dumping of spoils / debris;
- Construction of culverts and drainage works;
- Road formation (gravel road shaping, sub-base and base preparation, shoulder and sidewalk construction);
- Road surfacing (use of bitumen for prime coat and surface dressing and/or concrete);
- Potential relocation of some public utilities like electric posts, telephone lines, irrigation and drainage ditches, gas pipes etc.;
- Provision of sidewalks and new drainage in the villages;
- Replacement, repair and rehabilitation of existing bridges[1];
- Provision of new rest areas at selected sites;
- Provision of road furniture and marking in accordance with international standards;
- Implementation of environmental protection and mitigation measures

4.9 Off-site Works

Off-site works will mainly relate to the extraction of construction materials from already existing and / or new borrow pits and quarries. However, findings so far indicate the absence of quarries and borrow sites in the close vicinity of the study

[1] Note: in total there are 41 bridges on the existing route. Out of these some will need to be replaced, repaired or may not require any interventions if they are in a satisfactory technical condition.

corridor. Therefore, hauling of construction materials to the work sites, and associated traffic will be of concern.

4.10 Construction

Construction activities will normally take place **within** the existing RoW, unless bypasses and extensions are determined feasible. Through the provisions contained in the contract documents the Contractors will be generally requested to plan their operations such as to minimize the physical impact on the adjoining human and natural environment. In addition the EMP will provide indications on where and how construction organization shall be adapted to the conditions of a specific site / road section so as to avoid or to minimize potential adverse impact on the human, the physical or the biological environment.

4.11 Implementation Schedule and Staffing

Since the IFI(s) for the Project have not been identified at this point in time implementation schedule and staffing are unknown. However the M3 FS shows a prioritized list of projects indicating the timeframe of implementation.

4.12 Lifespan of the Project

The proposed Project is designed for a lifespan of 20 years provided that routine and periodic maintenance is carried out.

5. PUBLIC CONSULTATION

5.1 Introduction

To facilitate reading, the present chapter provides only a summary of the public consultation process. More details can be found in Appendix 1 and in the Social Impact Assessment Report.

5.2 Scoping Meetings

Scoping meetings were held at the following strategic locations:

Location	Date	Number of Participants
Cimislia	22.10. 2008	41
Comrat	22.10. 2008	23
Giurgiulesti	23.10.2008	29

In total 93 elected officials, citizens, stakeholders and NGO representatives participated in these meetings. The expectations in the project area are extremely high. While almost all of the stakeholders expressed appreciation for the planned road rehabilitation, a number of concerns were also raised during the course of the discussions and consultations.

6. ENVIRONMENTAL BASELINE

6.1 Introduction

The following information on environmental baseline is mainly drawn from existing sources, such as official thematic maps, literature and official internet documents. This information was complemented by data obtained during the field visits and the public consultation process.

6.2 Characterization of the Physical and Natural Environment

6.2.1 General Topography and Landscapes

The topography of the country is generally characterized by hills and plains, with the plateaus being mainly located in the Central part, which is slightly inclined from the North-West to South-East. Overall, the country is relatively low-lying, with semi-arid steppe developed in the plains in the southern parts. The hills in the Central part of the country are densely forested, while arable fields replaced the natural grass cover of the plains and steppes in the North and South. Absolute elevations hardly exceed 400 m, the absolute maximum (429 m) is reached in the Central part of the country. The relief altitudes vary from 5 m (Giurgiulesti and the end point of the study corridor) to 429 m (Balanesti).

As is shown in the following **Figure 5** the territory of the country is divided into two natural zones and five landscape regions:

a) Forest Steppe Zone

This natural zone occupies the northern and central parts of the country and is characterized by alternating plains and plateaus. The flora of this zone is rich with characteristic forest, steppe and meadows formations. Soils are mainly composed of normal and leached chernozems, as well as dark chestnut and brown soils in the oak and beech forests and under the meadows. According to the physico-geographical conditions the forest steppe zone can be distinguished into three landscape regions[2]:

[2] Source: 1st National Biodiversity Report 2001

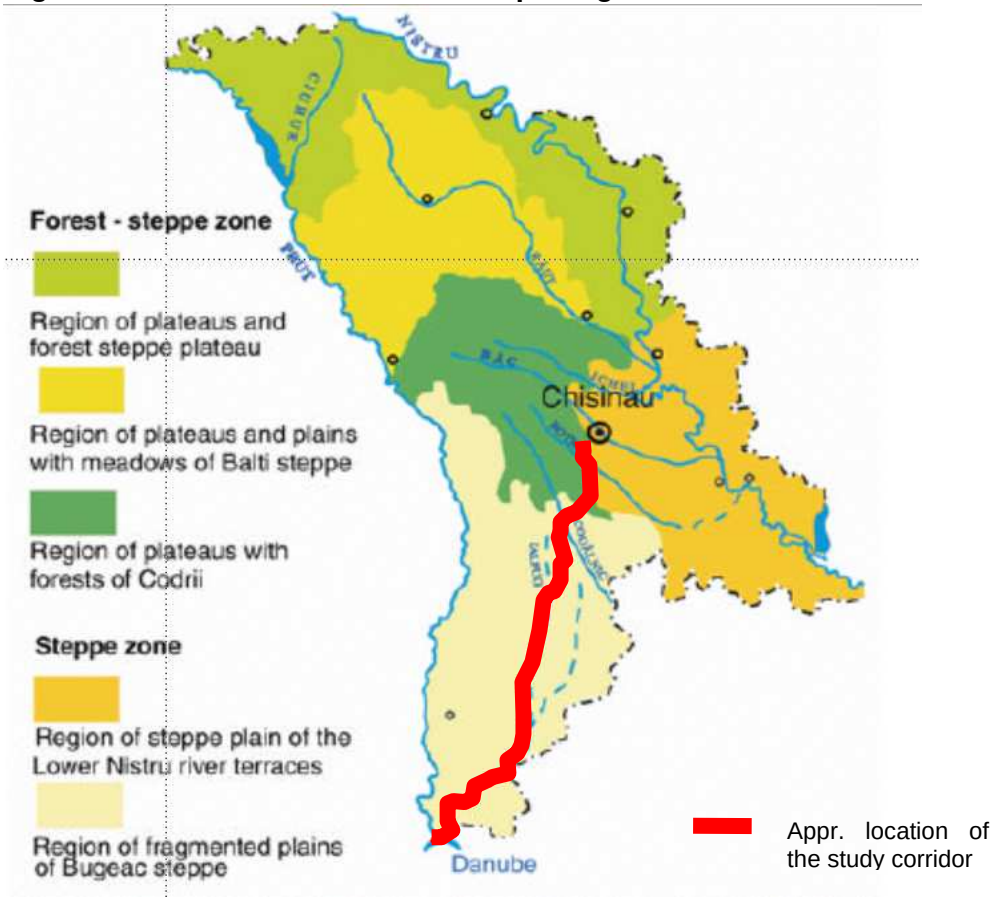
- Region of plateaus and forest steppe plateaus in the North of the country;
- The region of plateaus and plains with grasslands of the Baltic Steppe;
- The plateaus of the Codri forests in the central part of Moldova.

b) The Steppe Zone

Is located in the South and Southeast of Modova. It comprises elements of the steppe and forest steppe but has a lower biodiversity than the latter. Within this zone normal carbonic and leached chernozems as well as regularly flooded meadow soils prevail. The landscape regions of the Steppe Zone are:

- The steppe plains of the lower Nistru River terrace, situated in the South-East of Moldova;
- Fragmented plains of the Bugeac Steppe in the Southwest and South of the country.

Fig. 5: Natural Zones and Landscape Regions of Moldova



source: Third National report on the implementation of the CBD. Chisinau, 2005

As can be seen from this figure only a short northern section of the road runs through a region that was initially covered by forest (Codri Forest region). On its further way to the south the route than runs through landscapes that are naturally occupied by steppe formations (Balti and Bugeac Steppes).

The level of degradation of the natural landscapes of Moldova is high due to intensive agriculture and high population density. Agricultural land occupy 75.14% of the territory of the country, forests – 9.6%, swamps – 0.16%, steppes and wet meadows are preserved as grazing fields – 11.23%. Of the latter only about 5% have preserved their high natural value; about 30% are still capable of self regeneration, the rest is degraded due to overexploitation. Seriously degraded soils occupy more than 13% of the country territory.

6.2.2 Geology

The Geology of the Republic of Moldova is dominated by Neogene, Quaternary and contemporary deposits.

Neogene deposits are developed all over the Republic and are represented by sands and loams, limestone and marls. In the south – west the thickness of Neogene deposits reaches 400 m.

The Quaternary deposits are also developed almost all over Moldova. In the river valleys their depth reaches 30 m. The thickness of deposits is increasing from north to the south. Loess-type loamy soils, sands, loams, silts and pebbles of the river valleys are prevalent.

Contemporary deposits are represented by deposits of gullies, waterway channels, various embankments, dams, channels, and contemporary landslide deposits. Most underground water bearing strata are formed by Neogene deposits.

The project area is located within the limits of central Moldova. The relief of this area is considerably cut with ravines and characterized by high seismic activity.

The area is formed by strata of middle Sarmate, upper Sarmate and Quaternary age. The middle Sarmate geologic formation is exposed in the valleys of the rivers Isnovat, Botnaand, Botnisoara and is represented by loams, sands and limestone.

Calcareous sand and loose limestone is exposed in the valley of the river Isnovat. The strata are represented by silty sands with limestone fragments and broken seashell; they are water-saturated and of middle rigidity. The exposed thickness is up to 3.4m and can be a basis for piles of the bridge over the river Isnovats and for piles of the viaduct over the motorway Singera – Bacioi – Cutuzov.

Upper Sarmate loams and sands occur on sections of deep excavations and high embankments. Exposed strata of loam reach a thickness of up to 19.0 m. If exposed to air weathering processes will rapidly impair the bearing capacity. The sands reach a thickness of 7-8 m.

Quaternary, alluvial deposits are exposed (opened) on the flood plains of Isnovat, Botna and Botnisoara rivers.

Moldova does not have any major mineral deposits but natural resources include deposits of limestone, sandstone and gypsum.

6.2.3 Geomorphology

The territory between Prut and Nistru Rivers is a part of a plateau that extends from the Bucovina Mountains and the Moldavian Sub-Carpathians in the West to the Nistru River in the East. On the left bank of Nistru River are the South-Western branches of the Podolia Plateau.

The relief is rather fragmented, with the highest fragmentation density in the Center and the South-Western part of the country (Ialpug Plain). Relatively reduced values of the fragmentary density are in Northern Moldova Plateau and in the Lower Nistru Plain. The relief, along with other geo-ecological, biotic and socio-human elements contributed to the landscape and eco-systems evolution. The evolution of the geo-ecological complex took place at the end of the Upper Pleis-

tocene and in the first half of Holocene. The biotic complex (vegetation and fauna) and soils were formed in the second half of the Holocene.

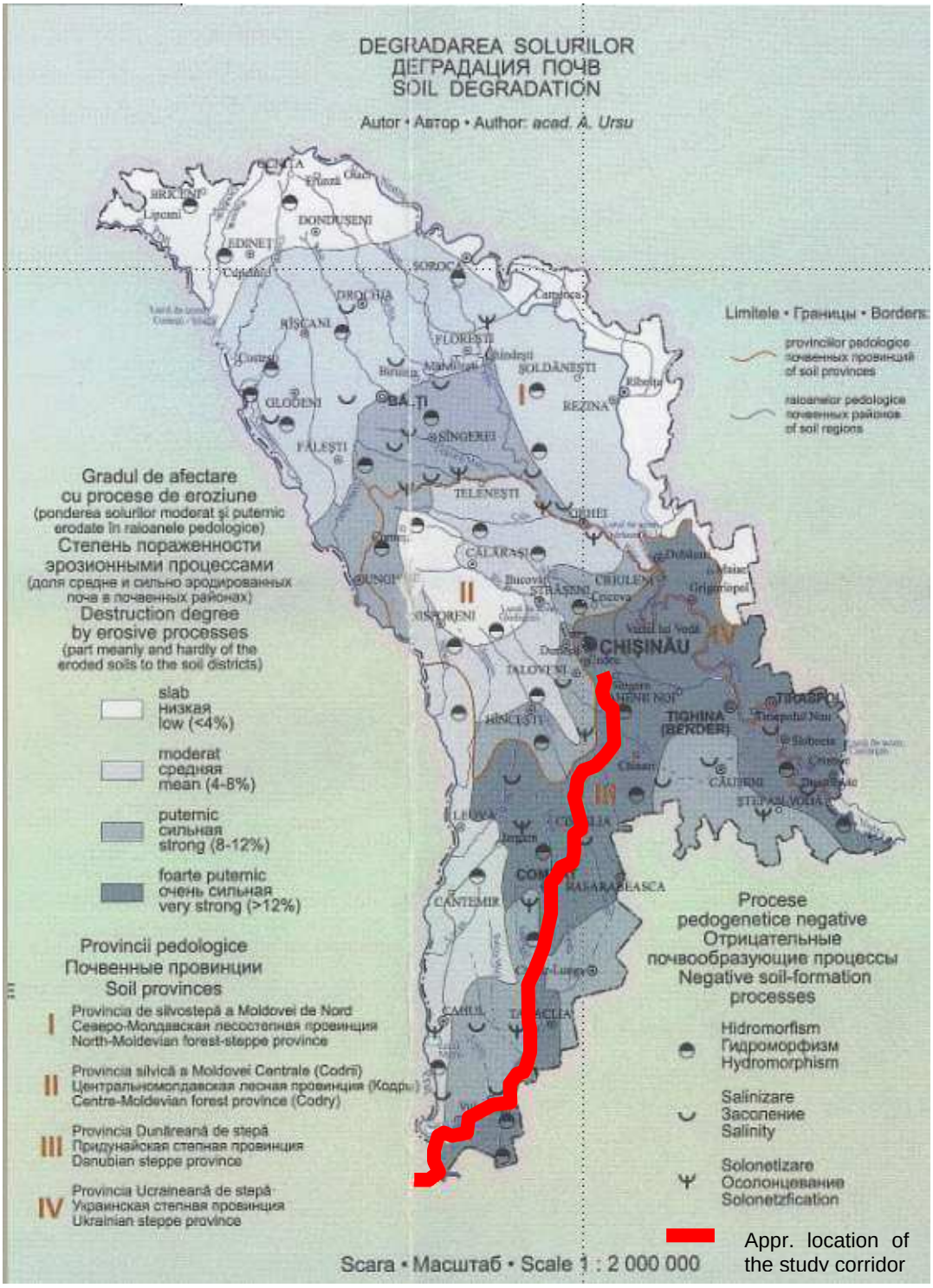
6.2.4 Soils

Three-quarters of the country are covered with fertile Chernozem soils which is the main natural resource in Moldova. The naturally productive soils and favorable climatic conditions support substantial and diverse agricultural production such as wheat, corn, barley, tobacco, sugar beets, soybeans, sunflower, fruits and vineyards. Beef and dairy cattle, as well as pigs, sheep and poultry are raised on a family farm scale. In the South of the country the prevailing soil type is simple Chernozem, one of the most fertile types of soils.

Alluvial soils characterize the floodplains, while the lower reaches of the Prut and southern river valleys have saline and marshland soils. The excessive use of chemical fertilizers, pesticides, and herbicides during the Soviet period has generally resulted in significant contamination of the soil and groundwater.

Figure 6 overleaf shows that the study corridor is located in a zone where the soils are classified as heavily degraded, mainly by erosion and other degradation processes (e.g. salinization).

Fig. 6: Soil Degradation



Source: Republic of Moldova Ecological State. Extract of a map produced by the Institute of Geography of the Academy of Sciences of the Republic of Moldova and IC 'Regionica' under a fund from the Ecologicl Fund of the Republic of Moldova and the WB/GEF Project No. TF051208. 2004

6.2.5 Hydrology and Drainage

The country has a well-developed network of rivers and streams, all draining south towards the Black Sea lowlands, and eventually into the Black Sea. Of the more than 3600 rivers and streams only 8 rivers and streams exceed 100 km in length. In fact, many of these are small, shallow streams that dry up during the summer. The Dniester (Nistru), Moldova's main river, is navigable throughout almost the entire country, and in warmer winters it does not freeze. River Prut is a tributary of the Danube, which it joins at the far southwestern tip of the country (close to the end of the Project road). Over 95% of the surface water in Moldova drains into Prut or Dniester. The main rivers in the southern part of the country (where the M3 is located) are **Cogîlnic** and **Ialpug**, both around 100 km long. Other smaller streams that are crossed by the road are (from North to South) Isnovat, Botna, Botnisoara, Ialpujeli, Cirsova Mare, Cerac, Salcea Mare and Cahul. Numerous other streams that are crossed are unnamed. Ialpug, Cogâlnic, and other small southern rivers largely drain into the Danubian estuary in nearby Ukraine. Most of the smaller water courses are fed by precipitation, the contribution of groundwater is limited. Maximum water levels are mainly in spring, following the snow melt, and in summer, when torrential rains may cause catastrophic flooding. During the rest of the year such small streams generally fall dry.

More detailed information on selected rivers of the project area is provided in Annex 3.

Moldova only has a few ***natural lakes***, most of them in the Prut and Dniester river floodplains. Water reservoirs were created for various purposes, e.g. irrigation, fish-farming, leisure, industrial and domestic needs, and flood protection.

Groundwater resources are limited in Moldova, especially in the southern part of the country, which is classified as water scarcity area. Groundwater is the major source of potable water supply for the majority of the rural population. The general characteristics of the mostly shallow aquifers are high salt contents of over 1.000 mg/l (in the belt between Comrat and Cahul even exceeding 3.000 mg/l) and nitrate contents. In the EU, the permissible limit of Nitrate content for potable water supply is 50 mg/l. This value is apparently exceeded almost every-

where in the south of Moldova, except in the area between Cimislia and Comrat, Balabanu and Vulcanesti and in a small area in the southernmost part of the country.

While high salt contents are mainly due to natural factors such as geologic and climatic conditions, high nitrate contents are caused by agriculture through inappropriate use of organic fertilizers. An overview of the situation of groundwater pollution for selected parameters is shown in **Figure 7.**

Fig. 7: Groundwater Pollution

Source: Republic of Moldova Ecological State. Extract of a map produced by the Institute of Geography of the Academy of Sciences of the Republic of Moldova and IC 'Regionica' under a fund from the Ecologicl Fund of the Republic of Moldova and the WB/GEF Project No. TF051208. 2004

6.2.6 Climate

The Climate of Moldova is moderately continental and characterized by a lengthy frost-free period, a comparatively mild winter, considerable temperature fluctuations and erratic rainfall, and, in the south, extended droughts. Average temperatures are -3.5℃ in January and +21.4℃ in July. Th e warm period of the year lasts about 193 days. Average annual rainfall decreases from 711 mm in the North-West to 600 mm in the South-East.

Extreme lows - near −36 ℃ in the north and excessi ve highs of about 41 ℃ in the south have been recorded. The country receives highly variable amounts of precipitation, usually averaging 500 mm annually, with totals a little lower in the south, but these figures conceal variations that may double the quantity in some years and result in prolonged dry spells in others. Most precipitation occurs as rain in the warmer months. Heavy summer showers coupled with the irregular terrain cause erosion problems and river silting.

Winter snow cover is thin. Winds tend to come from either the Northwest or Southeast.

According to recent records annual average temperatures are rising in Moldova: In 2006/07 as in the previous two years - temperatures were higher than average. In 2006, the average annual air temperature at different meteorological stations exceeded the multiannual values by 0.5-0.8°C. The years 2006/07 were also characterized by higher amplitudes of the temperature regime, with some extreme values recorded. In 2006 the absolute minimum was –30°C (which statistically occurs once every 30 years) and the absolute maximum +36° C. Precipitation was close to the normal annual values, except for the South of the country. Winter started much later than usually, but was much colder (particularly January with an average temperature of 2.5-3.5°C below the multiannual average). The snow cover lasted 80-95 days (until the end of March) in the North and the Centre of the territory, which is longer than usual.

Average spring temperatures of 2006 were close to average, but precipitation significantly exceeded average levels. March was particularly wet: in some areas in the North and the centre of the country precipitation was 105-120 mm, which represents four times the monthly average and was observed for the first time over the entire observation period. Summer was hotter than usually with the average summer temperature exceeding the multiannual average value by 1°C. In the South a marked deficit of precipitation was recorded. Autumn was very warm and dry, especially in October and November. The average seasonal temperature exceeded the multiannual average value by 1.5-2.0°C. A considerable deficit of precipitation was recorded over the entire country territory (50-70% from the multiannual average).

6.2.7 Natural Hazards

The territory of the Republic is exposed to some unfavorable natural processes and phenomena, such as erosion, land slides, earthquakes, etc. Torrential rains, draughts, desertification processes, strong winds, tornadoes, hails, spring and autumn frosts are other common natural phenomena in the region.

Natural calamities like droughts, heavy rains (often with hail), massive floods, hurricanes, snow storms, extremely cold winters and other destructive processes became increasingly frequent in the recent past. During the warm periods of 2004 and 2008 several heavy rains (often with hail) occurred during May, July and August, sometimes accompanied by storms and vortexes. During the warm period

2007 heavy drought was recorded in May – September, causing high social and economic damage.

Moldovan landscapes are naturally susceptible to ***landslides***, a phenomenon that is often triggered by human activities such as construction on dangerous slopes resulting from poor physical planning. As regards the study corridor along the M3 the known areas susceptible to landslides are:

- northeast of Cimislia (close to the village Prorumbrei within the M3 extension and Chimislia bypass alternative); and
- South of the village Ciumai (~ km 151) where an improvement of the existing alignment is proposed.

Fig. 8: Landslide area at km 35 within the M3 extension alternative

As regards ***seismicity*** the Project route runs through two seismic regions:

Bacioiul - Cicur Minjir: In this seismic region earthquakes up to level 7 on the Richter scale may occur.

Bugeac - Guirgiulesti: In this seismic region earthquakes up to level 8 on the Richter scale may occur.

6.2.8 Biological Environment

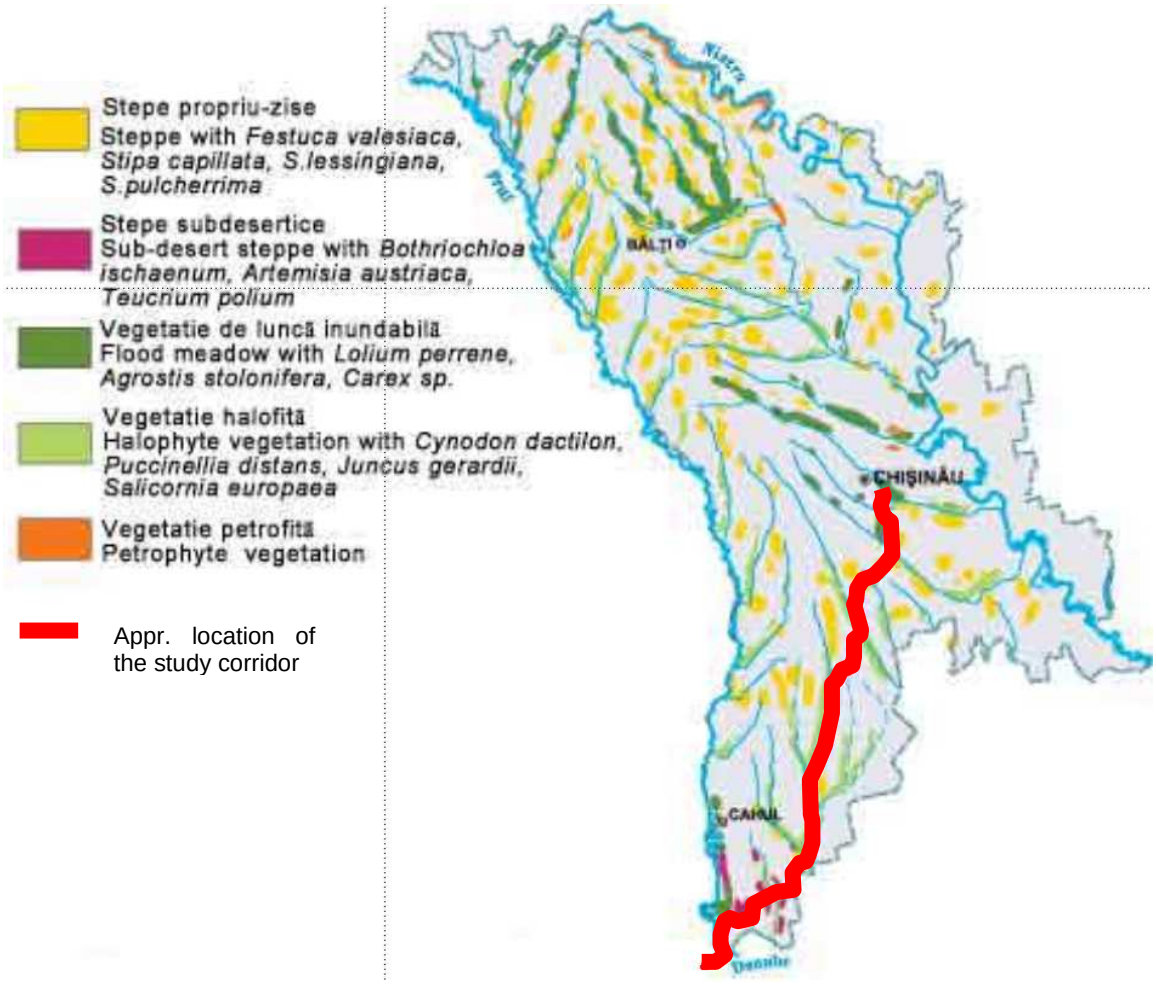
The geographic location, climate and landscape of Moldova provide favorable conditions for the development of a rich flora and fauna. The Red Book of the Republic of Moldova (2001) includes 126 species of flora and 116 species of rare and/or endangered animal species that are protected by law.

Flora

As was mentioned earlier in this report, the territory of the Republic of Moldova can be distinguished into two natural vegetation zones, forest steppe and steppe. The *steppe zone* covers the plains and highlands located South and East of the Central *Codrii Plateau* and the *Tigheci Hills*. In addition, steppe vegetation appears in the North of the country (the *Bălti steppe*). Almost all former steppe areas and especially the *Bugeac Region* (through which most of the study corridor runs) are now being used for agriculture. As a result only fragments of natural steppe communities remained, mainly on steep hillsides or areas affected by landslides. Such steppe fragments are mainly formed by xerophytic *Poaceae*, such as *Festuca valesiaca* and *Stipa* species. *Asteraceae* and *Lamiaceae* are also common (see **Figure 9**). In the very south of the country fragments of subdesert steppes remain. These communities are sparsely vegetated, resistant to drought and high temperatures and have a short period of growth. They have a less diverse flora than other steppe communities and are dominated by *Andropogon spec., Artemisia spec.* and *Thymus spec..*

Steppe ecosystems include a diverse and unique flora and fauna with a high biodiversity. They play an important role in soil stabilization and are important ecotonal habitat elements in the forest and agricultural landscape. The few remaining steppe communities are under constant pressure through the expansion of pastures and overgrazing.

Fig. 9: Steppe and River Meadow Vegetation in the Republic of Moldova



Source: Republic of Moldova: Biodiversity Conservation National Strategy and Action Plan [3]

Lush meadows and reed growths occur in parts of the floodplains of the River Prut, while salt-marsh grasslands flourish in the saline valleys of the rivers Cogâlnic, Ialpug, and lower Prut. Local larger stands of reed were also observed at around km 84 of the M3 in the immediate vicinity of the road within the flood-plain of the river Lalpug.

The *forest steppe zone* located in the northern part of the country includes forest communities, mostly located in hilly areas alternating with steppe vegetation ar-

[3] Available at: http://bsapm.moldnet.md/Text/Pagina%20web%20Strategia/Englez/Cuprinstotal.html

eas. Moldovan forests basically consist of communities of broad-leaved species (98%) dominated by oak and acacia. The dominant forest species are english oak and durmast oak (*Quercus petraea*), locally in association with beech (*Fagus sylvestris*). In the South, pubescent oak (*Quercus pubescens*) groves occur on the hillsides. Alluvial forests are spread in the river floodplains and mainly consist of willow (*Salix spec.)* and poplar (*Populus spec.)*.

At the beginning of the 19th century, forests covered about one-third of the country. However, a large increase in population severely reduced the forested areas. At the beginning of 2006 forests covered ~ 363 000 ha (10.7% of the country's territory). The extensive deforestation in the 19th century has resulted in soil erosion, wind damage, lowering of the water table, flooding, and loss of fauna. The current forestation level is considered insufficient for ensuring an effective ecological balance.

In the study corridor such forests are restricted to relatively short sections, approximately between km 5 and km 8 in the vicinity of the village Baclol, and between km 23 and km 30 south of the village Razeni."

Fauna

The occurrence and abundance of animal species mainly depends on the type and area of habitats that provide food resources and shelter and on the level of disturbance that these habitats may be exposed to. As most of the former natural steppes have been converted to arable lands many of the typical animal species have disappeared.

The current most common mammals of Moldovan ***forests*** are fallow deer, wild boar, fox, badger, squirrel, marten and wild cat. Bird species include orioles, magpies, hoopoes, nightingales, blackbirds, etc.

Typical s***teppe animals*** include several species of rodents like hare, hamster and shrew and birds such as skylark, quail and partridge[4].

[4] Source: 3rd National Report on the Implementation of Biodiversity, December 2005

The artificial **lakes, wetlands and marshes** provide ecological niches for many birds, including migratory species. As can be seen from the following **Figure 10** the study corridor is almost entirely located within the Eastern European migration corridor. In this context the lakes located along the Project road (e.g. km 18, km 87 - north of Comrat-, between km 126 – Svetii - and 134 – Balaban - may have important functions as staging or feeding habitats for migratory species.

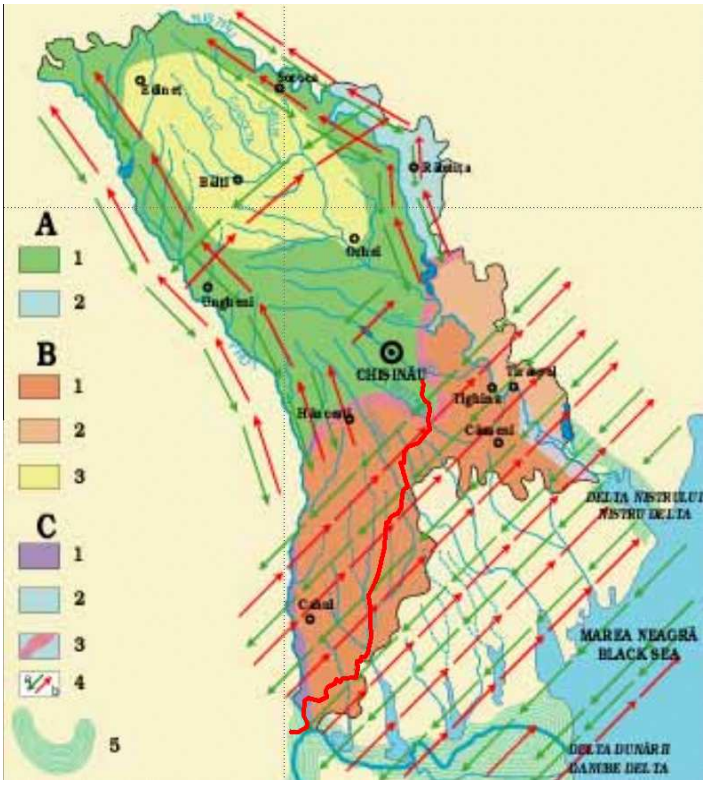
The same lakes (artificial reservoirs) also support abundant fish resources including carp and perch, bream, ruff and pike from the rivers.

Agricultural ecosystems occupy about 75,6% of the Republic and are also the prevailing type of land use along the study corridor. Among mammals rodents prevail. Common bird species breeding in these open anthropogenic habitats are skylark, tufted lark, quail, bunting, white wagtail and others.

As regards the protection of biodiversity the 1st National Report of 2001 indicates the following secondary habitats to be of major importance for flora and fauna which should thus be given special attention:

- Lakes;
- Swamps and riparian meadows along the rivers;
- Agricultural areas with perennial crops and mixed cultures;
- Areas with a well developed mosaic of arable lands and natural vegetation; and
- Animal migration corridors

Fig. 10: Zoogeographical division and bird migration routes in Moldova



Regionarea zoogeografică şi căile de migraţie a păsărilor pe teritoriul Republicii Moldova

A – Zona de silvostepă. Sectoare zoogeografice de pădure:
1 – Codrii; 2 – Râbnița.
B – Zona stepelor. Sectoare zoogeografice de stepă:
1 – Bugeac; 2 – Tiraspol; 3 – Bălți.
C – Sectoare zoogeografice interzonale:
1 – Prutul inferior; 2 – Nistrul inferior;
3 – limită interzonală;
4 – căile de migrație a păsărilor:
a) toamna, b) primăvara;
5 – Rezervații biosferice.

A - Forest steppe zone. Zoogeographical forest sectors:
1 - Codrii; 2 - Râbnița
B - Steppe zone. Zoogeographical steppe zones:
1 - Bugeac; 2 - Tiraspol; 3 - Bălți
C - Inter-zonal zoogeographical sectors:
1 - Lower Prut; 2 - Lower Nistru;
3 - Inter-zonal boundary;
4 - Bird migration routes:
a) autumn, b) spring;
5 - Biosphere reservse

Appr. location of the study corridor

Source: 1st National Biodiversity Report, 2001

6.3 Protected Areas

Natural State Protected and Significant Areas

The Law on the Natural State Protected Areas Fund (NSPAF), approved in 1998, set the legal basis for creating and maintaining the NSPAF, the principles and mechanism of implementation, as well as the prerogatives of the central and local authorities, economic entities, NGOs and citizens on this matter.

The Law established 12 categories of natural protected areas, eight of which correspond to the IUCN classification: scientific reserve, national park, nature monument, natural reserve, landscape reserve, resource reserve, multifunctional management area, biosphere reserve; and four categories of national interest:

botanical garden, dendrological garden, landscape architecture monument, zoological garden.

The requirements of the Law on NSPAF have been detailed in the framework statutes for every category of natural protected area, as well as in specific statutes for every natural protected area. In early 2006, the NSPAF comprised 1225 objects totaling 66,467 ha or 1.96% of country's territory. In November 2006, the NSPAF Law was modified to include three wetland areas of international importance, one of which, the Lower Prut Lakes (19,152 ha) are located at the southern end of the study corridor. This area is also included in the site list of the Ramsar Convention. Today Moldova's protected areas total 157,227 ha , i.e. 4.65% of the territory.

Despite the taken measures to conserve and extend the natural protected areas, their current condition is poor. The NSPAF Law is not currently properly enforced and its requirements are often violated. Following the land reform, many of the protected areas are now managed by economic entities, mayoralties, schools, etc, which neither show interest nor have the capacity for maintaining them in good condition (see following textbox)

The state of *natural reserves* is generally good, protection zones are marked and warning posters are installed. In some forest natural reserves the protection regime is only partially observed, and grazing, fishing and waste dumping episodically occur.

The state of the *landscape reserves*, comprising 41 sectors, is pretty bad and practically they do not correspond to IUCN criteria. Lack of finance does not allow meeting even the most elementary requirements of the Law on the NSPAF and the international conventions. The intensively visited areas are under severe impact and both the landscape and biodiversity are suffering. This concerns the landscape reserves Saharna, Tapova, Trebujeni, Ivancea, Capriana, „Suta de Movile", etc. The management of these areas is deficient: there are no fitted stopovers for visitors; tourist routes are not marked; rules for visitors are not visualized; etc. The authorities' supervision is practically missing; consequently legal requirements are not enforced. A serious impediment in observing the protection regime is the tenure problem since areas within several landscape reserves have been privatized and economically used.

An important particularity of Moldova is the inclusion of 13 etalon sectors of soils in the NSPAF. Most of these areas are in a poor state: no landmarks; sometimes they are used for agriculture purposes; often the local authorities even do not know about their existence.

The *multifunctional management areas* include 32 sites. The protection regime of these areas is only partially observed. The natural zones subject to a special protection regime are not delineated, no landmarks, no warning posters. During the last decades the *landscape architecture monuments* (old parks) and the architecture monuments (mansions, family tombs, and other buildings) suffered the most. During the last years, the condition of many of them worsened. In 2006, works were implemented to rehabilitate and conserve the old parks and architecture monuments in Ţaul and Mîndîc.

The State Ecological Inspectorate, in cooperation with the local authorities and the police, undertook a number of compliance checks and took action in order to enforce the Law on NSPAF. In 2006, the protection regime and status of 357 protected areas was checked. The main offenses revealed were related to the viola-

tion of the regime of protected areas through extraction of minerals (limestone, sand, gravel, etc.), grazing and other illegal activities on their territory.

Protected Areas of the Study Corridor

Ramsar Sites

'Lower Prut Lakes. *20/06/00*. Judet Cahul. 19,152 ha. 45º42'N 028º11'E. The River Prut forms the western border of the site as well as the state border with Romania, and the site extends to the river's confluence with the Danube. Consisting of Ramsar Wetland Types O (permanent freshwater lakes), M (permanent river), and 1 (fish ponds), the site is considered to fulfil Criteria 2 on vulnerable species and especially 3 on biodiversity. Lakes Beleu and Manta are unique ecosystems, described as the last natural floodplains in the lower Danube region. The system is important for groundwater recharge, flood control, and sediment trapping, and it supports an imposing list of rare and threatened species of flora and fauna. A number of heritage sites can be seen in the area, including some of Roman Emperor Trajan's wall (ca.100 A.D.). Fish harvests have been decreasing markedly in recent years, forests are generally seen to be deteriorating, and quite a few adverse conservation factors have been listed as requiring attention. A management plan is in preparation, particularly in hopes of creating a UNESCO Biosphere Reserve over more or less the same site'[5].

Legally Protected Areas

The protected areas are indicated according to the Law on State Protected Area no. 1538 (25.02.1998 and amendments until 2007). The following list shows the areas with official protection status within a corridor of approximately 1 km to either side of the M3.

[5] Source: The Annotated Ramsar Lst: Moldova

Tab. 8: AREAS OF GEOLOGICAL AND PALEONTOLOGICAL IMPORTANCE

Nr. Crit.	Name	Area (ha)	Location	Land owner
5	Fossil settlement near	10	Between the villages Moscovei and Dermengi; village Moscovei parcel 18, sub-parcels 2,3 Cahul	State Forest Farm in Taraclia region, Moscovei Forest sector
6	Tartaul Steep	2	At km 2 North of Tartaul de Salcie village, on the left slope of the Salcia river	Agriculture Company "Taraclia de Salcie"
20	Baurci Cropping, Ceadir-Lunga Region	1	On the road Congaz-Baurci, at km 2 from the bridge over the river Iaplug, Forest sector Congaz, parcel 38, sub-parcel 12	State Forest farm Iargara
21	Ceadir-Lunga Steeps, Ceadir-Lunga Region	10	East of Ceadir- Lunga city, Forest sector Ceadir-Lunga, parcel 46, sub-parcel 2	State Forest Farm Cahul
20	Cotofana Steep, Cimislia Region	10	East of Gura Galbena village (forth from north, on the left gradient of Valea Cotofana vale) Forest sector Zloti, Cotofana, parcel 33, sub-parcel 3.5; parcel 34, sub-parcel 3,8,12.	State Forest Farm Cimislia
23	Geologic Section from the valley of Ialpug River; Comrat Region	5,6	Comrat city, left gradient of the river valley Ialpug, Forest sector Comrat, Comrat – IV, parcel 34, sub-parcel 11	State Forest Farm Iargara
80	Cropping near Taraclia city	4,1	South of Taraclia city, along the left gradient of the vale, Forest sector Taraclia, Taraclia-II, parcel 20, sub-parcel 1	State Forest Farm Cahul

Tab. 9: FORESTS

Nr. Crit.	Name	Area (ha)	Location	Land owner
8	Molesti-Razeni, Cainari Region	250,7	Forest sector Razeni, villa Molesti-Razeni, parcels 30-32; sub-parcels 1,2,7; parcel 33, sub-parcels 1,5	State Forest Farm Cimislia
15	Moisei hollow, Cimislia Region	101	Mihailovka Forest Sector, Moisei hollow, parcel 15, Comrat Region	State Forest Farm Cimislia
16	Bolgrad High School; Cimislia Region	54	Near Frumusica village, Forest sector Congaz, Bolgrad High school, parcel 26, sub-parcel 2	State Forest Farm Iargara
50	Vadul lui Isac; Vulcanesti Region	68	Forest sector Slobozia, Vadul lui Isac, parcel 33	State Forest Farm Cahul

Nr. Crit.	Name	Area (ha)	Location	Land owner
51	Flamanda; Vulcanesti Region	71	Forest sector Vulcanesti, Flamanda parcel 14, sub-parcel 3; parcel15, sub-parcel 4; parcel 22, sub-parcels 9,12; parcel 24, sub-parcels 2,7; parcel 26, sub-parcel 6,9; parcel 28, sub-parcel 3; parcel 32, sub-parcel 5	State Forest Farm Cahul

Tab. 10: MEDICINE PLANTS

Nr. Crit.	Name	Area(ha)	Location	Land owner
LANDS 2	Cahul	343	Forest sector Larga, Romini, parcels 28,29,31-33,39,40	Cahul State Forest Farm
4	Bugeac, Comra t Region	56	West of the head office of the nr 2 brigade	Agriculture com-pany “Bugeac”

Tab. 11: LANDSCAPE RESERVES (Geographical landscapes)

Nr. Crit.	Name	Area (ha)	Location	Land owner
16	Cimislia hollow, Cimislia Region	256	South of Cimislia city, on the road to Basarabeasca city, forest sector Ciucur-Mingir, Oziornoe, parcel 3, sub-parcels 11,13,15; Recea, parcel 7, sub-parcels 1,4,5,10; Bacanciu parcel 5, sub-parcel 5,9,11,13-15,17-19,22,23,25,27,29	State Forest Farm Cimislia

Tab. 12: PROTECTED RESOURCES

Nr. Crit.	Name	Area (ha)	Location	Land owner
2	Micelar-carbonatated fat Chernozem of the steppe Danube area ; Cahul Region	4	Field nr.10 of the cropping sys-tem, at the south-east of Rosu village	Rosu village town hall
3	Forest xerophytic Cher-nozem of the steppe Danube area; Cahul Region	200	Forest sector Larga, Romani, parcels 27-29	Cahul State Forest Farm
5	Simple Chernozem of the Danube steppe area; Comrat Region	4	Tractor Brigade nr 2, field nr 7	Agriculture com-pany “Maiac”

AREAS WITH MULTIFUNCTIONAL MANAGEMENT

Tab. 13: REPREZENTATIVE AREAS WITH STEPPE VEGETATION

Nr. Crit.	Name	Area (ha)	Location	Land owner
1	Steppe sector north of Bugeac, Comrat Region	4	Bugeac village, at the border with Cimislia region	Agro-industrial complex "Bugeac"
2	Steppe section north of Bugeac, Comrat Region	15	Dezghindea village, 3 km north of the animal complex	Agriculture Company "Rodina"
5	Steppe section south of Bugeac; Taraclia Region	50	Near Vinogradovka village	Agriculture Company "Ciumai"

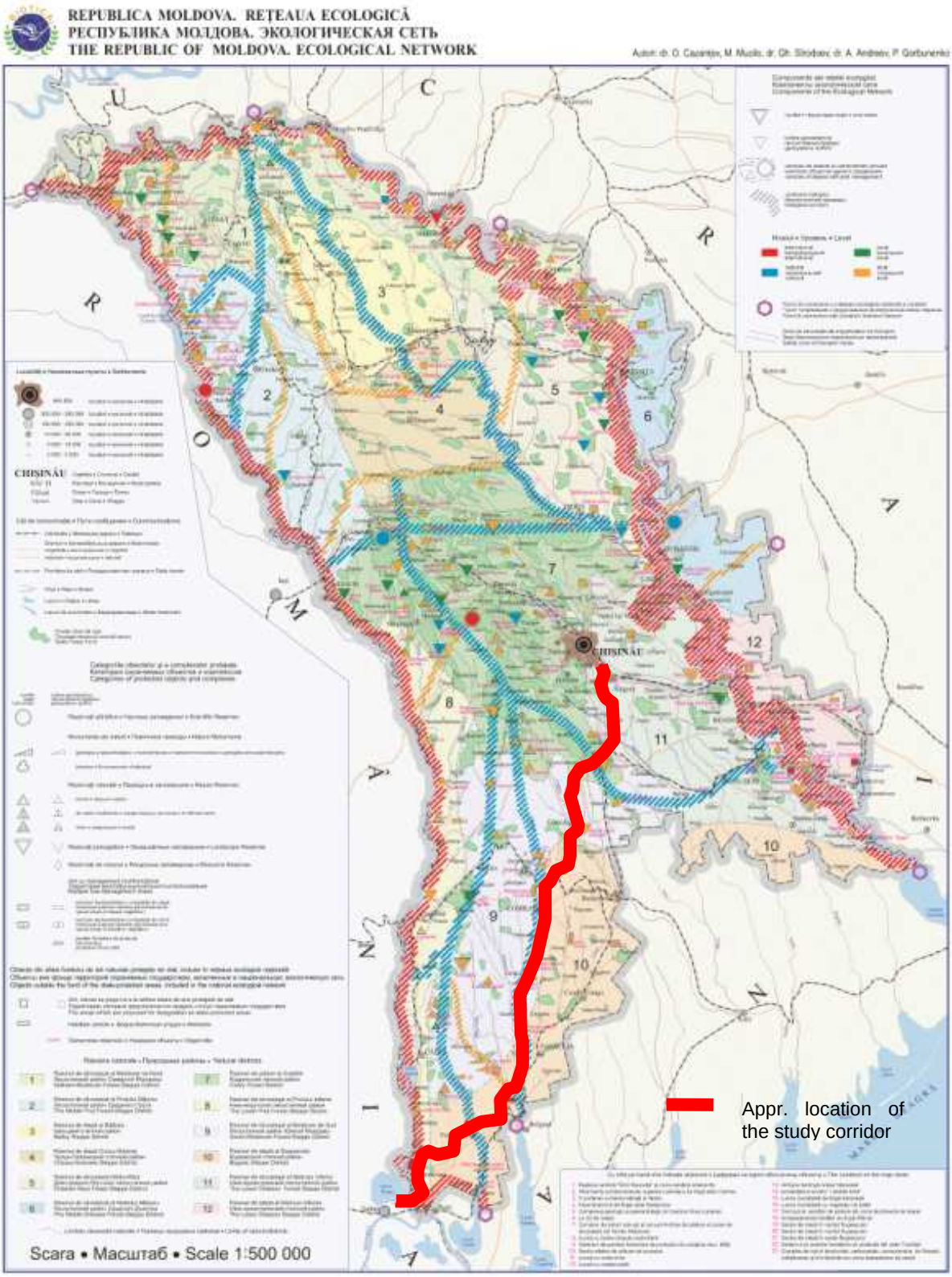
Tab. 14: FOREST PROTECTION BELTS

Nr. Crit.	Name	Area (ha)	Location	Land owner
1	Forest protection curtains system in Tvardita village; Ciadir-Lunga Region	80,2	Tvardita village, number of the belts: 1-5 (7,1 ha), 8-22 (20,5 ha), 27 (1,7 ha), 39 (0,98 ha), 43 (1,1 ha), 49-50 (2,6 ha), 52 (1,4 ha), 54-59 (7,2 ha), 65 (1,3 ha), 68-69 (2,3 ha), 73-75 (3,7 ha), 77 (0,8 ha), 81-86 (5,3 ha), 88 (1,6 ha), 96-97 (2,7 ha), 99 (2 ha),100-108 (19,8 ha)	Agriculture Company "Lenin"

All protected areas form an integral part of the 'National Ecological Network' (NEN) as shown in the map **Figure 11** overleaf.

As can be seen from this map parts of the M3 corridor (approximately the section in between Burgeac and Burlaceni) have been classified as a 'biological corridor' of national importance.

Fig. 11: Figure 5-6 Republic of Moldova Ecological Network



source: Republic of Moldova: Third National Report on the Implementation of the CBD

Green Belts

They occur around all reservoirs and lakes as well as along rivers. They are protected by the 'Law for the protection of zones and belts alongside river and water basins' of 1995. The Law establishes defined zones inside which only limited economic activities are permitted. These zones are as follows:

Major rivers (e.g. Prut)	100 m to either side
Rivers 100 – 200 km long (Ialpug, Cogilnic)	50 m to either side
Smaller rivers	20 m to either side.

Planned Protected Areas and other Significant Sites

No information was obtained on ***other planned protected areas***.

The ***planted avenues and shrubs*** that exist throughout the road corridor are assessed as significant elements of the landscape. In a predominantly anthropogenic environment these elements fulfill multiple functions such as providing

- food, shelter and bio-corridors for animals;
- windbreak and thus protection of arable lands against wind erosion;
- Shadow for non-motorized road users;
- Protection of adjacent arable land against accumulation of traffic-bourne air pollutants;
- Fruit (mainly nuts).

In a predominantly open and rather 'empty' environment, these avenues also have a positive aesthetical effect on the landscape as can be seen in below figure.

Fig. 12: Walnut Tree (*Juglans regia*) rows on section Balabanu (R38) to Ciumai

Rare and Endangered Species

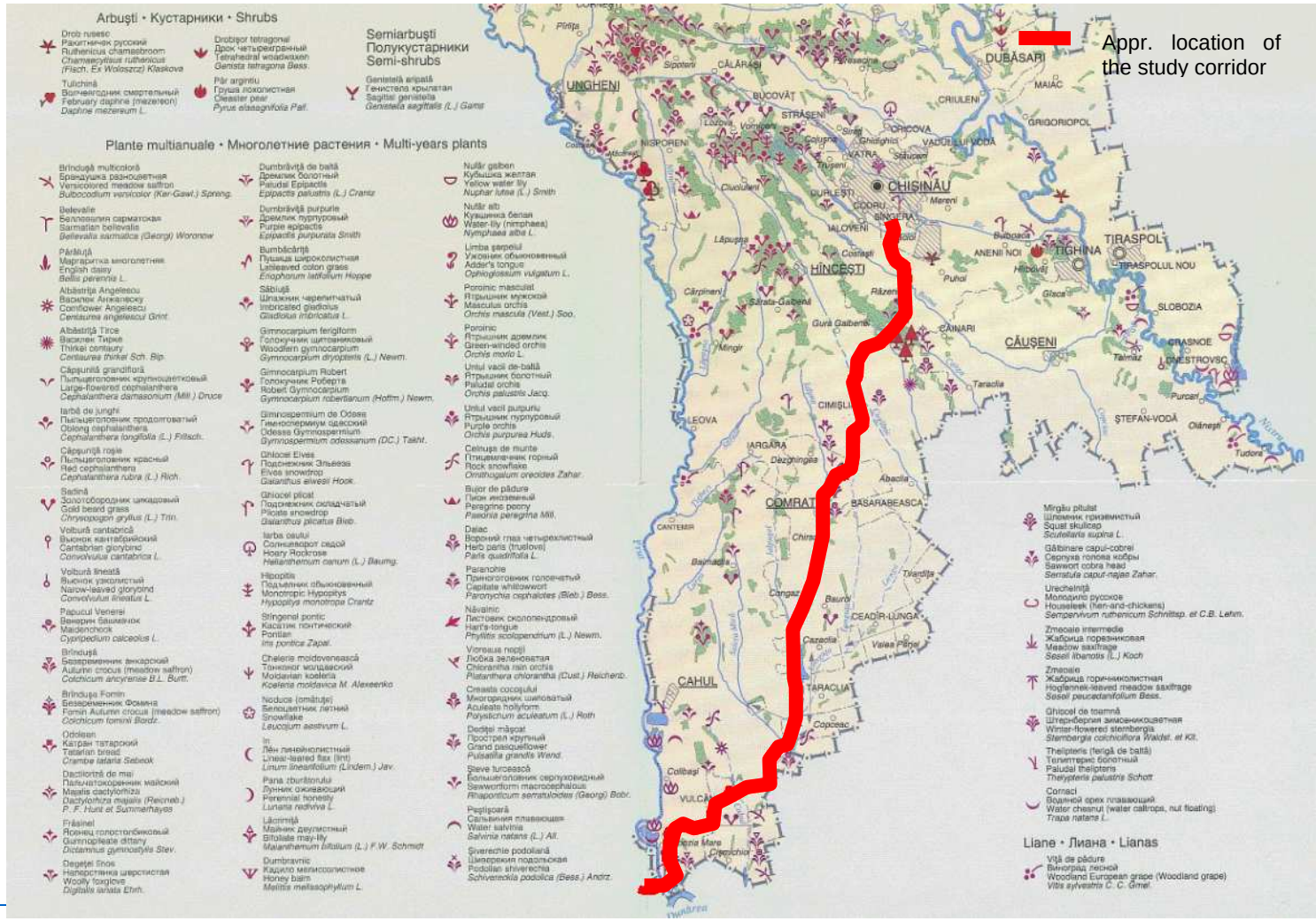
According to the available official information the study corridor does not cross significant known habitats of ***rare or endangered animal species*** (see **Figure 13**). This statement, however, does not exclude that some local populations of rare or endangered species may exist.

According to the available official information **r*are or endangered plant species*** occur in the valley of River Lalpug, East and Northeast of Comrat and in the South of the study corridor. Species indicated for the Lalpug valley are *Polystichum aculeatum, Colchicum fominii Bordz, Ornithogalum oreoides Zahar, Koeleria moldavica, Serratula caput-najae and Cranbe tartaria.* However, the scale of the map (of which an extract is provided in **Figure 14**) does not allow for the identification of the concrete location of the respective habitats of these species.

Fig. 13: Occurrence of Rare Animal Species in the Study Corridor

source: Republic of Moldova: Biodiversity Conservation National Strategy and Action Plan

Fig. 14: Occurrence of Rare Species of Animals in the Study Corridor



Source: Republic of Moldova: Biodiversity Conservation National Strategy and Action Plan

6.4 Existing Environmental Pollution

Air Pollution

While 15-20 years ago the industrial and energy sectors were the main polluters, road transport represents the current main source of emissions. According to the MENR, noxious emissions have increased by 10-15% p.a. during the last five years. By the end of 2005, the total of these emissions was of ≈ 155-160.000 t, which is 45.000 t more than in 2000. Due to the significant increase of imported 2nd hand motor cars, road transport accounts for about 90% of total emissions. According to recent estimates emissions of every second Diesel car and those of every third motor car with a carburettor engine exceed the applicable standards. Nevertheless, the number of vehicles controlled for their emissions decreased because of staff reductions in the regional units. Currently, only 20% of the motor cars are regularly controlled by the environmental inspectors each year.

While estimates of traffic bourne emissions do exist for Chisinau, no such data are available for the rural areas, including the study corridor. However, given the lack of any significant stationary sources of emissions (e.g. industries), the current traffic volumes and the open character of the landscape it can be assumed that air quality is not currently an issue of significant environmental concern in the study corridor. As regards the existing road itself the stands of trees and / or bushes that are found along many sections of the M3 do play a role in protecting adjacent arable fields from the accumulation of traffic-bourne pollutants. Within settlements avenue trees also have important functions in filtering pollutants, thereby contributing to the protection of air quality and thus the health of the local population (see illustration in **Figure 15**). Moreover, these trees and shrubs minimize the effects of wind erosion on the adjacent arable lands, provide food and shelter to a number of animals and, given the linear shape of these avenues, function as bio-corridors.

The beneficial effects resulting from the existence of these avenue trees and shrubs along the M3 will increase as traffic volumes grow and should thus be protected during design and implementation of the Project.

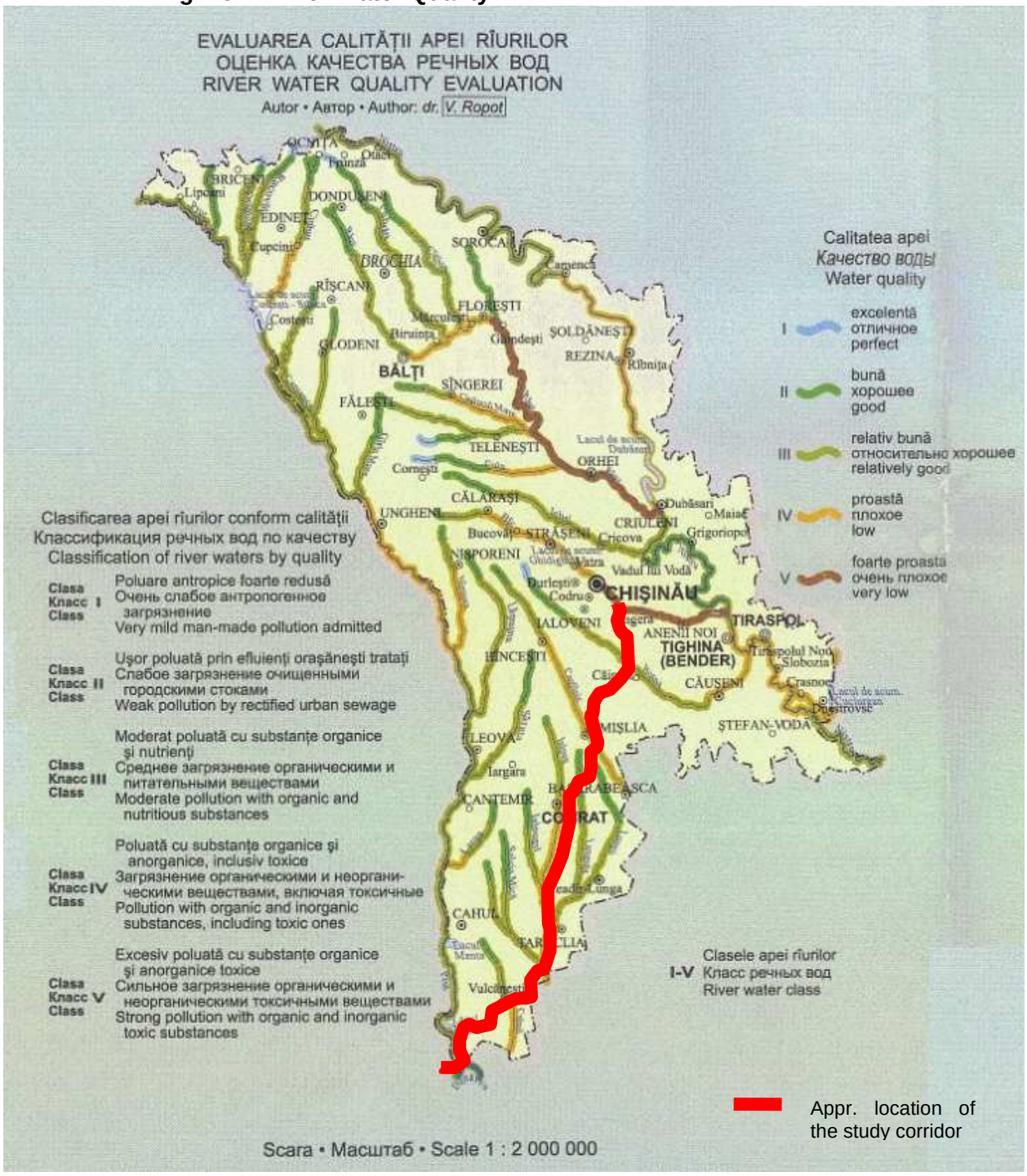
Fig. 15: Filtering Role of Vegetation

Source: The Word Bank; Roads and The Environment. A Handbook (Technical Paper No. 376). WB, Washington DC 1997

Surface Water Pollution

Detailed and up to date information on the water quality of the rivers and streams that are crossed by the Project road are not available. However an overview of the situation of some selected rivers and streams is provided in **Figure 16**. According to this source water quality of streams generally deteriorates on their way to the south. While River Botna still has a class III water quality (= 'moderate pollution with organic substances and nutrients') over a relatively large distance, others like Cogilnic, Ialpug and Cahul deteriorate to class IV (= 'pollution with organic and anorganic substances, including toxic ones') downstream of larger towns / villages like Cimislia, Comrat and Vulcanesti. Rivers Iapugel and Salcia Mare (crossed by the Project Road at about km 121+350 and 150+410 respectively) have a class II water quality at these points.

Fig. 16: River Water Quality



Source: Republic of Moldova Ecological State. Extract of a map produced by the Institute of Geography of the Academy of Sciences of the Republic of Moldova and IC 'Regionica' under a fund from the Ecologicl Fund of the Republic of Moldova and the WB/GEF Project No. TF051208. 2004

Groundwater Pollution is described in above chapter “Hydrology and drainage”.

6.5 Cultural Heritage

Trajan's Wall (*Valul lui Traian* in Romanian) is a complex of valla in Eastern Europe (Romania, Moldova and Ukraine). Contrary to the name and popular belief, the ramparts were not built by Romans during Trajan’s reign.

The remnants in Moldavia comprise earthen walls and palisades. There are two major fragments preserved in Moldova, both of which are crossed by the road under study, i.e. the Upper Trajan's Wall (crossed by the existing M3 alignment at about km 50 in between the villages Valea Perjei and Ecaterinovca) and Lower Trajan's Wall (crossed by the M 3 in the area of km 164).

The ***Lower Trajan's Wall*** is thought to be dated by the 3rd century, and built by Antharc and stretches about 126 km from the village of Vadul in Kagul region by the Prut River, stretches into the Ukraine and ends at Lake Sasyk by Tartarbunar.

The ***Upper Trajan’s Wall*** is thought to be constructed in 4th century by Greuthungi goths in order to defend the border against the Huns. It stretches 120 km from Dniester River by Kitkany in Teleneshty Regoin to Prut River.

6.6 Borrow Pits and Quarries

Based on the compiled information and evaluation of the availability of material suitable for road pavement construction purposes the following material sources are proposed to be used for the extraction of suitable material for the current project:

- Soroca, granite quarry
- Micauti, limestone quarry
- Piestris, limestone quarry
- Viscauti, gravel and sand borrow area

- Cobusca Veche, sand borrow pit

Material from the above quarries could be used for bound and unbound pavement layers but the distance to the project road and long haulage has to be considered. Detailed description of the borrow areas is part of the Geotechnical report. Location of the borrow areas is shown on the material sources location map that is attached as annex 3 to the Geotechnical Report. Permission and licences for the use of the proposed borrow areas and exploitation of material have to be obtained from the relevant authorities in agreement with the landowner.

Fig. 17: Micauti Limestone quarry

6.7 Road Safety

For the purpose of the present FS a traffic safety audit was conducted for the study corridor based on traffic accident data from the Road Police Division for the years 2004 through 2007 and summarized data for the first half of 2008 (see chapter 3 of the FS main report for details). During that period a total of 106 accidents occurred along the study corridor, resulting in 159 injuries and 35 fatalities. Between 2004 and 2007 accidents with injuries increased dramatically by 130% and fatalities by 160%. In the first half of 2008 the number of fatalities has been almost as high as the total of 2006 and 2006.

From the field trips additional observations were that donkey carts frequently used the road in the dark. In addition, cattle herds were locally observed on the road in the vicinity of settlements. With improved road quality and resulting higher speeds both these aspects may result in critical situation with regard to road safety.

7. SOCIOECONOMIC BASELINE

Socioeconomic baseline is described in the Social Impact Assessment Report which is a stand alone document.

8. ENVIRONMENTAL IMPACTS AND MITIGATION

8.1 Introduction

As was explained earlier in this report the M3 road Project will consist of a series of road improvement sections. Definition of the length and location of these road improvement sections have been identified within the FS. These future sub-projects will be most likely financed by different, however, not yet identified IFIs.

With regard to the potential environmental impacts and mitigation measures there has to be a differentiation in between the different types of sub-projects. These are:

- Road sections for rehabilitation only
- Road sections for reconstruction inclusive of widening of existing carriageway and
- Road sections that are to be newly built (bypasses and new alignments).

Depending on the type of the respective sub-project and in accordance with national and IFI provisions the level of required environmental assessment is to be determined. This means that for rehabilitation and reconstruction sections in most cases a category B assessment is required whereas for road sections that are to be newly built a category A assessment will be necessary.

As a result of the FS the road sections Comrat to Balabanu (R38) and Balabanu (R38) to Ciumai are proposed for the engineering design and preparation of tender documents. Both sub-projects are reconstruction road sections and as regards there overall environmental impact to be assessed as category B projects. Therefore for these sub-projects it is not necessary to conduct a full scale EIA, but it is necessary that an Environmental Management Plan (EMP) is prepared as part of the design documents.

Out of the numerous options of bypasses and new alignments that were investigated during conduct of the FS only the

- M3 extension and Cimislia bypass and the
- M 3 extension and Comrat bypass
- Giurgiulesti to Vulcanesti (marginal)

options turned out to merit further investigation. These newly to be build road sections are to be assessed as category A projects for which the present study recommends separate EIAs to be conducted during the detailed design phase. In addition land acquisition and compensation issues have to be dealt with separately in the SIA report.

In the following potentially occurring environmental impacts as well as mitigation measures are described for 3 different Project stages, i.e. the design, construction and operation stage of the M3 road corridor. Thereby focus is laid on M3 rehabilitation and reconstruction road sections because the new alignment and bypass sections are to be assessed as category A and will therefore require a separate EIA to be conducted.

8.2 Impacts and Mitigation Measures referring to the Planning and Design Phase of the Project

As regards the online schemes of the road corridor (reconstruction and rehabilitation sections) there will be only minor environmental impacts. With regard to the biological environment it is important to note, that the design of the online schemes of the road corridor will not cause the loss of valuable habitat or biodiversity hot spots, nor will it cause new fragmentation of currently undisturbed natural habitats.

The design of the Project will generally follow the existing Moldovan SNIP standards. Some local adjustment of these standards should however be taken into consideration during the decision making process to increase the potential benefits of the investment for beneficiaries. Based on the findings from the field trips, baseline analysis, feedback obtained during public consultation and discussions among the study team the following should be taken into consideration:

Existing village passages:	• Provide pedestrian walkways in every village, if possible on either side of the road; • Provide lay byes for buses in both directions
Between neighboring villages and sections with existing accident hot-spots	• Provide paved shoulders for safe accommodation of non-motorised traffic, e.g. between
Potential flood hazards after torrential rains within certain road sections	• Provide state of the art drainage facilities to reduce risk of flooding

Alongside many road sections tree rows, shrubs and avenues are planted. As already described these structures are assessed as significant elements of the landscape.

In case of the reconstruction sections the design road is being overlaid to the existing road. For this reason tree losses are put to a minimum.

However tree losses may occur even within the reconstruction sections, for example within the sections Comrat to Balabanu (R38) and Balabanu (R38) to Ciumai that are proposed for the engineering design. Tree losses are either due to smaller alignment shifting that will be necessary at some places due to technical reasons or because of embankment fillings in the stem area of the respective trees. Necessary tree cuts will than have to be compensated within the frame of an EMP that will be part of the design planning of the respective road section.

8.3 Impacts and Mitigation Measures referring to the Construction Phase of the Project

In sections where only rehabilitation and upgrading of already existing road sections is proposed within the RoW no major environmental impacts are expected and land acquisition would not be required. In these cases most potential environmental impacts will be limited to the construction phase, such as dust and noise generation, odour nuisance resulting from the use of bitumen, traffic disruption caused by the temporary disposal or transport of construction materials or

waste etc. Further issues may be erosion control, labour camp or traffic management. These impacts are common in road rehabilitation works and can be mitigated with existing management techniques. In order to minimize potential off-site impacts, materials (e.g. asphalt, stone, etc.) would be supplied only from sources with approved licenses, permits, and/or approvals for environment and worker safety. Construction equipment used during construction would meet internationally recognized standards for environment and worker health and safety.

Accordingly within the construction phase direct and indirect adverse environmental impacts may arise from a series of sources and affect various receptors of both the human and the natural environment.

8.3.1 Borrow areas

The volume of borrow materials that will be used for a selected sub-project is to be determined within the design planning stage of the respective sub-project. It is suggested that extraction be undertaken from the borrow areas described in above chapter 6.6 Borrow Pits and Quarries. All proposed borrow areas are already in operation. Thus environmental impacts concerning potential disfigurement of landscape, vegetation losses and damage to access roads are kept to a minimum. However there might be long distance haulage.

While the contractor will be sourcing the borrow materials under their own arrangement, the following measures to minimize impacts associated with the operation of borrow areas shall be implemented:

- Secure all required environmental approvals and carry out extraction and rehabilitation activities consistent with the pertinent legal requirements and/or permit conditions;
- Prior to operation of the borrow areas, submit to the construction supervision the following:
- A plan indicating the location of the proposed extraction site as well as rehabilitation measures to be implemented for the borrow areas and access

roads upon project completion. Rehabilitation measures may not be necessary for borrow areas still in operation after road works have finished;

- Dust management plan which shall include schedule for spraying on access road and details of the equipment to be used
- Undertake regular dust suppression on all unpaved access roads during the construction period, particularly in sections where critical receptors, such as settlements, are located;
- Locate stockpiles away from watercourses to avoid obstruction of flow and siltation;
- Provide cover on haul trucks to minimize dust emission and material spillage;
- Undertake repair of access roads to their original condition

8.3.2 Contractor's work camps

The establishment of contractor's work camps may cause adverse impacts if various aspects such as liquid and solid waste disposal, equipment maintenance, materials storage, and provision of safe drinking water supply are not addressed properly. The location for the contractor's work camp is to be decided by the contractor. To ensure that minimal impacts will arise from the choice of the location and the operation of such areas, the contractor shall prepare the following plans:

- Layout of the work camp and details of the proposed measures to address adverse environmental impacts resulting from its installation.
- Sewage management plan for provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses;
- Waste management plan covering provision of garbage bins, regular collection and disposal in a hygienic manner, as well as proposed disposal sites for various types of wastes (e.g., domestic waste, used tires, etc.) consistent with appropriate regulations; and
- Description and layout of equipment maintenance areas and lubricant and fuel storage facilities including distance from water sources and irrigation facilities. Storage facilities for fuels and chemicals will be located away

from watercourses. Such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination.

Prior to establishment of the work camps, conduct consultations with local authorities to identify sources of water that will not compete with the local population.

Provide safe drinking water supply for the workers. The quality of water shall comply with the national standards.

8.3.3 Preparatory Works and Earthworks

Tree felling, clearing and soil stripping are part of routine preparatory works. They bear risks like unjustified tree felling or dumpage of excavated top soil with excess spoil instead of recovering and stockpiling it for re-use.

There may be a surplus of material for certain road sections. In addition site preparation will involve removing and temporary storage of top soil, detailed quantities of which will be calculated in design phase of the respective subproject. Such materials, if not properly managed will contribute to erosion, siltation and obstruction of watercourses and drainage, and may impact on aquatic biota. Improper storage of topsoil could also lead to loss of fertility.

The provisions of Moldovan SNIP provisions will have to be complied with to minimize negative impacts associated with earthworks. Specifically, topsoil shall be stripped and reused to cover areas where excess materials will be dumped. Long-term stockpiles of topsoil will be immediately provided with a grass cover and protected to prevent erosion or loss of fertility.

Materials that will not be used will be transported to the final disposal sites as extraction proceeds to minimize exposure to the elements that could cause erosion. The contractor shall also undertake regular spraying of water on haul roads to suppress dust emission, especially along sections that will pass close to settle-

ments. Upon completion of the project, the contractor shall provide spoils stockpiles with grass cover.

Before site preparation activities commence, the contractor shall submit a soil management plan to the construction supervisor detailing measures to be undertaken to minimize effects of wind and water erosion on stockpiles, measures to minimize loss of fertility of top soil, timeframes, haul routes and disposal sites. The selection of disposal sites will be conducted in consultation with local authorities and landowners. To avoid soil compaction, particularly of agricultural land, the contractor shall confine operation of heavy equipment within the ROW, as much as possible.

8.3.4 Bridge Rehabilitation/Reconstruction

In addition to the rehabilitation/reconstruction of the already existing road, there will be rehabilitation/reconstruction of existing bridges and the new construction of already existing culverts.

Construction works may alter the local drainage pattern and may also cause impairment of the quality of surface waters as a result of increased erosion in disturbed areas. The works associated to the repair and replacement of culverts could have an adverse temporary effect on fish and other aquatic fauna through siltation.

To mitigate such impacts, the project design should incorporate installation of cofferdams, silt fence, sediment barriers or other appropriate devices to prevent migration of silt during excavation and boring operation within rivers or streams. During bridge demolition, the contractor shall avoid "dropping the bridge" into rivers/streams.

Dewatering and cleaning of cofferdams will be performed to prevent siltation, by pumping from cofferdams to a settling basin or a containment unit. Discharge of sediment-laden construction water (e.g., from areas containing dredged spoil) di-

rectly into surface watercourses will be forbidden. Sediment laden construction water will be discharged into settling lagoons or tanks prior to final discharge.

The contractor shall submit a method statement or plan for the execution of bridge construction works including measures that will be undertaken to address adverse environmental impacts such as erosion of river embankment and siltation of watercourses that may result from such activities.

8.3.5 Asphalt Plants

The establishment of a new plant shall take into consideration the following measures to ensure that there will be minimal impacts on settlements and productive land: (i) asphalt plants must be located downwind of settlements at a distance of 500 meters or more; (ii) the contractor shall secure approval from the construction supervision for installation and operation of asphalt plants; (iii) the contractor shall have provisions for spill and fire protection equipment and shall submit an emergency response plan (in case of spills, accidents, fires and the like); and (iv) asphalt plants shall not be located close to plantations and productive land.

In road rehabilitation the most severe possible water quality impact could come from spilled bitumen or any petroleum products used to thin the bitumen. Bitumen is stored in drums which may leak or which are often punctured during handling after long periods (more than 6 months in the elements) of storage. Bitumen will not be allowed to enter either running or dry streambeds and nor can be disposed of in ditches or small waste disposal sites prepared by the contractor. Bitumen storage and mixing areas must be protected against spills and all contaminated soil must be properly handled according to requirements laid down in the pertinent legal provisions. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up.

8.3.6 Water Pollution

Various activities (earthworks, asphalt plant, borrow area operation) associated with the road project may cause deterioration of surface water quality if appropriate measures are not implemented. Especially when construction activities are being carried out on or in the vicinity of watercourses there is a risk of pollution. Proposed mitigation measures have been presented in the previous sections and will have to be elaborated in detail within the EMP of selected sub-projects.

8.3.7 Air and Noise Pollution

Impacts on air quality are expected to occur as a result of exhaust emissions from the operation of construction machinery; fugitive emissions from aggregates, concrete, and asphalt plants; and dust generated from road construction/rehabilitation works, along haul roads, exposed soils, and material stock piles. The following mitigation measures will be implemented to by the contractor to reduce emission levels: (i) maintenance of construction equipment to good standard and avoidance, as much as possible, idling of engines; (ii) banning of the use of machinery or equipment that cause excessive pollution (e.g., visible smoke); (iii) establishment of aggregate, asphalt, and concrete plants as far away as possible (minimum 500 m) from human settlements and operation of such facilities within the terms of Government pollution control guideline; and (iii) submission of a dust suppression program which provides detailed action to be taken to minimize dust generation and equipment to be used to construction supervisor prior to construction. The contractor shall seek the approval of the concerned local authority regarding sourcing of water to avoid competition with the local population on water demands.

During construction, the operation of heavy machinery can generate high noise levels. In order to minimize impacts due to excessive noise and vibration, work will be restricted to between 0600 to 2100 hours within 500m of the settlements. In addition, a limit of 70 dBA shall be set in the vicinity of the construction site and strictly followed.

8.3.8 Impact on Fauna and Flora

For the online schemes impacts on vegetation and wildlife along the road corridor are not expected to be significant since the rehabilitation will be undertaken within the existing ROW. Further, there are no protected and densely vegetated areas within the influence area of these alignments as well as in the proposed borrow areas. However in some sections, for instance at the Comrat to Balabanu (R38) and Balabanu (R38) to Ciumai reconstruction sections tree plantations (predominantly walnut trees, *Juglans regia*) alongside the project road are abundant.

The designed road is within the RoW of the existing road. Therefore tree losses are put to a minimum. However at some stretches it is technically not possible to prevent cutting of individual trees. Location of tree cuttings and mitigation measures shall be described in the EMPs of the respective sub-project.

In addition there are road side poles that are used as stork nests along the existing alignment, one of them being located within the vicinity of Ciumai. To protect these nesting sites suitable mitigation measures will have to be developed within the frame of the EMP of the respective sup-project road section.

Fig. 18: Stork nest on road side pole close to the village of Ciumai.

8.3.9 Construction Water

During the construction / rehabilitation process water will be required for the compaction of material. In this context the need for larger volumes of construction water (e.g. for the compaction of granular material and for the spraying of haulage routes) may become an issue of environmental concern. Sources for the construction water shall be the water channels along the project road and natural rivers.

8.3.10 Health and Safety

If not properly managed work camps and construction sites pose health and safety risks. Transmission of diseases is likely under conditions with inadequate heath and safety facilities and practices. The contractor shall provide the following: (i) adequate health care facilities (including first aid facilities) within construction sites; (ii) training of all construction workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work; (iii) personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with pertinent SNIP regulations; (iv) clean drinking water to all workers; (v) adequate protection to the general public, including safety barriers and marking of hazardous areas in accordance with Safety Regulations for Construction, Rehabilitation and Maintenance, 1978; (vi) safe access across the construction site to people whose settlements and access are temporarily severed by road construction; (vii) adequate drainage throughout the camps to ensure that disease vectors such as stagnant water bodies and puddles do not form; and (ix) sanitary latrines and garbage bins in construction site, which will be periodically cleared by the contractors to prevent outbreak of diseases. Where feasible the contractor will arrange the temporary integration of waste collection from work sites into existing waste collection systems and disposal facilities of nearby communities.

8.4 Impacts and Mitigation measures referring to Operation Phase

After completion, the Project will have positive indirect impacts on human health and safety through decreased number of accidents, reduced air pollution resulting from more constant rates of travel speeds on rehabilitated road sections, cleaning up of solid waste from roadside drains, and reduced water pollution resulting from rehabilitated drainage systems. Residents in the area of influence of the road subprojects will benefit from: (i) a reduction in travel times and in transport costs, (ii) improvements in the quality of road passenger and cargo transport; and, (iii) employment generation.

However during the operational phase, both direct and indirect adverse environmental impacts may arise from a variety of sources and potentially affect various receptors.

8.4.1 Water Pollution

During the operation stage of the project, accidents near a watercourse will have the potential of affecting water quality if this involves vehicles transporting toxic and hazardous substances. Provisions such as road signs and markings, guardrails, streetlights, improved horizontal alignments and traffic control structures, replacement of unsafe bridges, and provision of pedestrian facilities in the project design will improve road safety and is expected to contribute to the reduction in the frequency of accidents along the road. In the vicinity of water courses, rivers, channels, spills etc., speed for vehicles carrying hazardous goods should be limited and periodically controlled by traffic police.

8.4.2 Air Pollution and Noise

Calculation of the expected levels of vehicle emissions during project operation was not undertaken. Regarding air pollution / ambient air quality the Project will have both positive and negative effects. Benefits will generally result from improved traffic flow, which entails improved fuel efficiency and better engine per-

formance, thereby reducing volume of vehicle emissions which otherwise result from bad road conditions.

However in the medium to longer term increasing traffic volumes will bring about higher noise levels and higher volumes of aerosol emissions, including lead and other solid particles, and also increased emissions of gaseous pollutants like NOx and CO^2;

Along sections of the road with sensitive receptors such as settlements and schools ambient air quality shall be regularly monitored. In addition speed control signs and speed limits along sensitive areas, especially along schools will keep noise and air emissions to a minimum.

8.4.3 Road Safety

Increased traffic volumes and speed raise the issue of road safety and the need to maintain speed limits and post appropriate signalization especially within settlements, along schools, at animal and livestock crossings. Safety measures for addressing these issues will have to be incorporated into the technical design of selected sub-projects. The measures comprise the design of safety features such as speed control signs, proper road markings, streetlights, pedestrian crossing, livestock crossing and other visual means at the entrance of and through the settlements, particularly along schools.

In addition increased traffic volumes and higher vehicle speeds are likely to directly or indirectly affect wildlife and potentially biodiversity through greater fragmentation of previously little disturbed natural habitats and weakening or loss of small animal populations through continuous road kills.

As a mitigation measure animal road kills should be monitored at sensitive road sections. In the case that accident hot spots with large mammals are identified, appropriate protective measures shall be elaborated (e.g. reflectors / local fencing, warning signs, speed reductions etc.)

8.4.4 Wild Dump Sites

'Wild' dumping of solid waste into road side drains is an institutional and community problem which is likely to continue in the long term unless these issues are addressed by the appropriate institutions, such as those responsible for solid waste collection and disposal, enforcement of environmental regulations, and the communities themselves;

8.4.5 Risk management for HIV/AIDS and Sexually Transmitted Infections (STI)

Risk management for HIV/Aids and Sexually Transmitted Infections (STI) is described in detail in the Social Impact Assessment Report which is a stand alone document.

9. SOCIO-ECONOMIC IMPACTS AND THEIR MITIGATION

Socio economic impacts and their mitigation are analyzed and described in detail in the Social Impact Assessment Report which is a stand alone document.

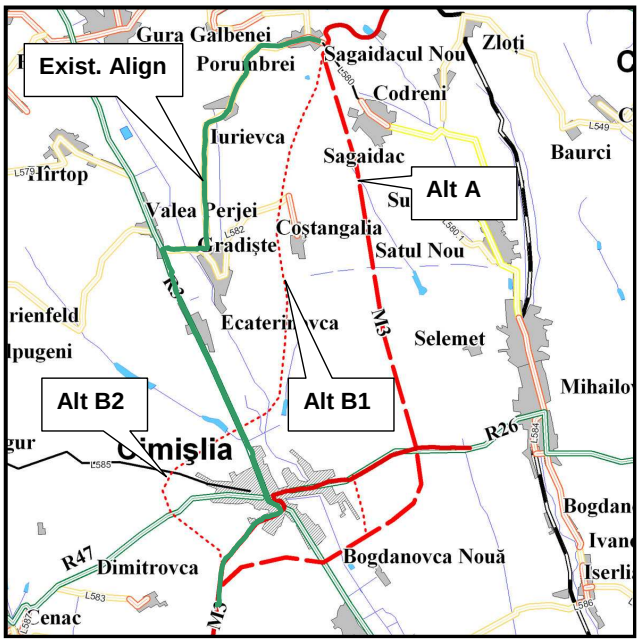
10. ANALYSIS OF ALTERNATIVES

As described in above chapter 4.4 many alignment options have been investigated within scope of work of this study. However from environmental point of view reconstruction of the already existing alignment is in most cases the best alternative as compared to new alignments or bypasses because it avoids newly build road sections with all the affiliated negative environmental impacts like disruption of habitats, sealing of agriculturally used soils, loss of valuable vegetation structures within formerly undisturbed areas etc. Therefore from environmental point of view it is in most cases suggested to stick to the already existing M3 road.

However looking on the existing M3-alignment a possible bottleneck could be the section from north-east of Porumbrei to south of Cimislia. On this section the existing M3 traverses several towns and villages within short distances. Therefore The beneficiary of the study: The Ministry of Construction and Territorial devel-

opment submitted a request to the study team to develop an alternate alignment that would connect the terminus of the existing 4 lane category I M3 at Porumbrei to the existing M3 corridor south of Cimislia.

Different variants that were compared within the FS are shown in below figure.



The results of comparison of these variants from environmental point of view is shown in below standing table.

Evaluation Criteria	Existing Alignment: Porumbrei to Cimislia South	Alternative A M3 Extension to Cimislia south	Alternative B1 Porumbrei to Cimislia North	Alternative B2 Cimislia Bypass
Air Quality	Based on expected traffic volumes it is not to be expected that existing legal standards for relevant air pollutants (e.g. CO, NOx, SO2, PB) are exceeded. However the most sensitive environmental receptor with regard to air emissions is human health. Because the existing alignment runs through the villages of Porumbrei, Iurievca, Gradiste, Valea Perjei and Ecaterinovca potential impact on air quality is considered as **high** for this variant.	Based on expected traffic volumes it is not to be expected that existing legal standards for relevant air pollutants (e.g. CO, NOx, SO2, PB) are exceeded. The variant doesn't traverse any villages or settlements which are the most sensitive receptors with regard to air emissions. However it traverses agricultural land. Therefore the potential environmental impact on air quality is considered **medium**.	Based on expected traffic volumes it is not to be expected that existing legal standards for relevant air pollutants (e.g. CO, NOx, SO2, PB) are exceeded. The variant doesn't traverse any villages or settlements which are the most sensitive receptors with regard to air emissions. However it traverses agricultural land. Therefore the potential environmental impact on air quality is considered **medium**.	**Like variant B1.**
Noise	With regard to noise emissions sensitive receptors are the residential areas within villages and towns. Highly sensitive receptors are special buildings like schools and hospitals. Because the existing alignment runs through the villages of Porumbrei, Iurievca, Gradiste, Valea Perjei and Ecaterinovca potential impact on air quality is considered as **high** for this variant.	Sensitive receptors are the residential areas within villages and towns. Because the variant avoids traversing any settlement area impact of this variant is considered as **low**.	Sensitive receptors are the residential areas within villages and towns. Because the variant avoids traversing any settlement area impact of this variant is considered as **low.**	**Like variant B1.**
Impact on archaeological sites / cultural heritage	The existing alignment crosses Trajan Wall at bout km 50 in between the villages of Valea Perjei and Ecaterinovca. Reconstruction of existing alignment will only add to this previous impact and is therefore considered as **low.**	Trajan Wall is crossed at a section where its characteristic peculiarity is already reduced due to previous impacts. Partly it has been converted to a farm track. Therefore impact is considered **low.**	Trajan Wall is crossed at a section where its characteristic peculiarity is already reduced due to previous impacts. Partly it has been converted to a farm track. Therefore impact is considered **low.**	**No impacts on archaeological sites identified.**

Evaluation Criteria	Existing Alignment: Porumbrei to Cimislia South	Alternative A M3 Extension to Cimislia south	Alternative B1 Porumbrei to Cimislia North	Alternative B2 Cimislia Bypass
Impact on Fauna	There is already a disruption of animal habitats due to the existing alignment. Therefore the additional impact due to reconstruction of the existing alignment will be only minor and mostly confined to the construction phase. Impact on Fauna is therefore considered as **low.**	Land use alongside the alignment is mainly agricultural with a variety of landscape structures like vineyards (partly abandoned), orchards, tree rows and grows. They offer habitat functions for a variety of animal species (birds, reptiles, mammals, various insects). Previous impacts are agricultural use and already conducted earthworks on the first half of the section. The variant would cause partly loss and disruption of animal habitats. Impact is considered as **medium.**	The different habitat types within the proposed alignment section (abandoned vineyards, orchards, tree rows and groves, meadows) offer living space for a variety of animal species. During field surveys on 26th of May golden orioles and storks could be observed. Impact on fauna is considered **high.**	Habitat types not as ecologically valuable as in section B1 due to lower diversity of agricultural use. Also previous impact of illegal landfill in first half of B2 lowers habitat value for different animal species. Impact is considered as **low.**
Impact on Flora and Vegetation	Reconstruction of existing alignment will only have very limited impact on roadside vegetation. Impact is considered **low.**	In first half of alignment section previous impact due to already conducted site clearing and earthworks. Loss of mainly agricultural fields in second half of alignment which are of minor ecological value. Impact is considered **medium.**	Alignment will cause loss of different valuable vegetation structures like vineyards (partly abandoned), orchards, tree rows, grows and meadows. Therefore impact is considered **high.**	Within the first km of the bypass section loss of tree plantations, especially within the cut section at km 19+600. Over most of the bypass loss of agricultural fields. Also previous impact of landfill in first half of B2. Impact is considered as **medium.**
Impact on soils	Reconstruction of existing alignment will only have very limited impact beyond	In first half of alignment section previous impact due to already	Loss of valuable agriculturally used topsoil. Impact is consid-	Loss of valuable agriculturally used

Evaluation Criteria	Existing Alignment: Porumbrei to Cimislia South	Alternative A M3 Extension to Cimislia south	Alternative B1 Porumbrei to Cimislia North	Alternative B2 Cimislia Bypass
	the already existing previous one and is therefore considered as l**ow.**	conducted site clearing and earthworks. Loss of very valuable Tschernosem soils in second half of alignment. According to information received in discussion in meeting on 21st of May bonity of topsoil 80% and higher. Impact is considered **high.**	ered **high.**	topsoil. Previous impact of landfill in first half of B2. Impact is considered as **high.**
Impact on ground and surface water	Reconstruction of existing alignment will only have very limited impact beyond the already existing previous one and is therefore considered as l**ow.**	Surface sealing will lead to increased surface water runoff and reduced infiltration rates. There are no water protection areas within the vicinity of the new road. Impact is considered **medium.**	Surface sealing will lead to increased surface water runoff and reduced infiltration rates. There are no water protection areas within the vicinity of the new road. Crossing of river Cogalnic at km 18+500. Impact is considered **medium.**	**Like variant B1.**
Geomorphology, landslides	No landslide prone section identified. Impact **low.**	Landslide prone area at km 35 close to beginning of the alignment section. Geological/Geotechnical assessment required. Impact considered **high.**	Landslide prone area at km 35 close to beginning of the alignment section. Geological/Geotechnical assessment required. Impact considered **high.**	No landslide prone section identified. Impact **low.**

Conclusion of the environmental assessment:

According to the overall ranking the alternative B1 causes the highest environmental impact, ranking high in 4 out of 8 environmental evaluation criteria. Second rank is alternative A ranking high in 2 out of 8 environmental evaluation criteria and medium in 4 of them. The existing alignment has the third rank providing a high evaluation with regard to two of the criteria and low evaluation in 4 of them. The alternative with the lowest environmental impact is the alternative B2 (bypass Chimislia).

When looking separately on human (air quality, noise, cultural heritage), biological (fauna, flora) and physical (soils, ground and surface water, geomorphology/landslides) environment the results are the following. With regard to the human environment the alternative with the highest impacts is the existing alignment option. All other alternatives rank equal. For the biological environment most impacts are caused by alternative B1 followed by alternative A, B2 and the existing alignment option. For the physical environment most impacts are caused by alternatives A and B1, followed by B2 and the existing alignment.

By summarizing the results and attributing the same weight to each of the criteria the environmentally best alternative is the B2 (bypass Chimislia), followed by the existing alignment option. Next comes alternative A followed by alternative B1.

10.1 The Do-Nothing-Option

The ‘do-nothing’ option cannot be considered as an environmentally desirable solution. This would entail the further deterioration of the existing M3 road. The potential overall adverse environmental impact of the Project is moderate and the identified issues can generally be managed and the potential impacts reduced to acceptable levels through the implementation of a set of mitigation measures during construction and operation.

The expected benefit of Project implementation for the local population generally outweighs the significance of potential adverse environmental impacts.

11. ENVIRONMENTAL MANAGEMENT PLAN

As described above this EIA report is dealing on the corridor level. After an ultimate International Funding Institution (IFI) for the implementation of the Project or potential sub-projects has been identified detailed EIA and EMP for selected sections, will have to be prepared varying in scope and extent depending on whether the respective section is an offline scheme (bypass) or an online scheme (online reconstruction or online maintenance).

The EMP that is to be prepared shall consider the Environmental Management Plan Framework (EMPF) that was developed in the course of the Sector Environmental Assessment (SEA, 2007) for the Moldova Road Sector Program Support Project. The table of potential impacts and mitigation measures that was developed within this Framework EMP is attached to this report as annex 2 and considers the construction and the operation phase of the road sub-projects.

Final EMPs that are to be developed shall describe the various measures proposed under a selected sub-project, which are designed to avoid or at least to mitigate the adverse environmental impacts that may result from this sub-project. As such the EMP shall consider all phases of the Project cycle, namely the detailed design, construction and operational phases of the Project.

To ensure that the proposed mitigation measures will be carried out by the contractors during the construction stage, the design consultant will clearly set out in the tender and contract documents the contractor's obligation to undertake the respective environmental mitigation measures.

The EMP shall be structured such that it lists all potential impacts identified in the frame of the respective sub-project and provides a description of the proposed protection or mitigation measures and attributes the responsibilities for their implementation.

12. PUBLIC CONSULTATION AND DISCLOSURE

12.1 Methods and Process

In accordance with EBRD/WB/MCC and GRM guidelines, participatory public consultations are carried out with a wide range of stakeholders in the Project area. It is also expected that consultations will continue throughout the implementation phase. The basic objective of the consultation is to raise awareness, get feedback from the stakeholders and improve decision making by considering local knowledge and information among different individuals, groups and/or organizations with interests and stakes in the project.

Field investigations and surveys were conducted in the Chisinau-Giurgiulesti-Romanian Border Project road between June and October, 2008. The main objectives of the field surveys included:

- Assessment of the prevailing environmental and social conditions along the project corridor from Chisinau to Giurgiulesti; and
- Identification of key environmental and social attributes likely to be affected following the implementation of the proposed project and thereafter.

The field visits also provided means of identifying stakeholders who have interests in the project. In order to adequately appreciate the views and concerns of stakeholders with regard to the project implementation, a number of persons, individuals and groups within the local communities were identified and consulted. The consultations were basically conducted in three formats as follows:

- Scoping meetings with a wide range of stakeholders held from 22-23 October 2008 in 3 strategic locations along the project corridor;
- Focused group discussions with a cross-section of men and women in the villages along the proposed road corridors; and
- Interviews with key informants including national government officials, local and municipal mayors; officials and staff of national and local devel-

opment agencies, managers of utility/service companies, nongovernmental organizations and other interested parties.

12.2 Scoping Meetings

Recognizing that community involvement is of great importantance to understand the nature and extent of potential impacts, especially socio-cultural impacts, and to assess the suitability and acceptability of mitigation measures associated with the Project a series of coping meetings was conducted. Comments and suggestions received on the Project as far as it is technically and economically feasible will be incorporated in the implementation of the project.

In coordination with local and state administration, and with the active support of the Ministry of Construction and Territorial Development, the series of environmental and social scoping meeting were conducted by the project team. Three locations were identified and scoping meetings were held in Cimislia, Comrat and Giurgiulesti. A total of 93 elected officials, citizens, stakeholders, and members of NGOs participated.

12.3 Stakeholders Issues and Concerns

While almost all of the stakeholders expressed appreciation for the planned road rehabilitation, a number of concerns were also raised during the course of the discussions and consultations.
These would include the following:

- Fear that the planned rehabilitation will not result into beneficial impacts for local communities;
- Potential loss of land/plots and destruction of properties, landmarks and monuments, damage and destruction to crops, and felling of trees during road construction;
- Potential loss of access to agricultural lands or urban center if the by-passes will not address the issue of connectivity;
- Increase in dust, noise and gaseous emissions along the road corridors;

- Influx of people including the Contractor's labor force in the project area with subsequent increase in social vices such as armed robberies, commercial sex, teenage pregnancies and spread of STDs and HIV/AIDS;
- Increase in child labor with students/pupils leaving school to take up employment;
- Potential damage to utilities including water pipes and telephone and electric power transmission lines along the ROW, damage to sidewalks and drainage system resulting in local flooding;
- Risks such as potential increase in siltation to valuable water bodies during road construction phase;
- Need for close coordination between the District Engineers and the Civil Work Contractors for work scheduling and technical details;
- Increased hazards and risk particularly to children along the constructed roads;
- Increase in water consumption leading to water shortages for the Contractor and local community;
- Increased security and peace and order problems along the rehabilitated roads;
- Delayed and non payment for construction materials by the Contractors.

12.4 Project Appreciation

The expectations in the project area are extremely high. Their perceived benefits of the proposed road projects are presented below as follows:

- Improve international trade and transport resulting in improved regional and local economic activities leading to better income opportunities;
- Increased trade and economic growth of the project area all leading to increased wealth, reduction of poverty and improvement of the living standards of the local community;
- Improvement of transport facilitating the farmers to access markets for their agricultural produce;
- Improvement in education standards and school attendance in the project area;

- Improvement of health conditions including faster access to city and district hospitals for acute medical cases and complicated pregnancies;
- Increased availability of farm inputs and technology due to easier access to farm areas;
- Increase farmers' incomes due to improved access to markets for agricultural produce;
- Increase in employment opportunities especially for the manual laborers;
- Reduction in vehicle maintenance costs;
- Faster transportation of people and goods with reduction in time spent in waiting for vehicles;
- Increase in the number of vehicles plying the new roads and a possible reduction in transportation costs;
- Reduction in past harvest losses;
- Increased agricultural production leading to improvement of incomes and reduction of poverty levels;
- Higher incomes from the farmers and other members of the community will result in increased revenue for both national and local governments;
- Increased economic spin-off effects benefiting women sellers through provision of food, foods and services for the labor force;
- Improved access of agricultural produce to the markets; and
- Reduction of rural-urban migration within the Project districts.

Issued
Chisinau, 06/2009

Kocks Consult GmbH
Consulting Engineers

Appendices

Appendix 1 Public Consultation and Coordination Materials

A.1.1 Invitation to the Scoping Meeting

State Road Administration

Invitation
to
Public Scoping Meeting

for

Feasibility Study for the Rehabilitation and Extension of the Road M3 Chisinau-Giurgiulesti/Romanian Border
Environmental and Social Impact Assessment

Dear Mr./Ms. :

We have the pleasure to invite you to a series of scoping meetings regarding needs for Environmental and Social Impact for the above mentioned project. Three public scoping meetings will be held:

Wednesday, 22nd October 2008, at 9.00 a.m. in Cimislia.
Wednesday, 22nd October 2008, at 15.00 p.m. in Comrat
Thursday, 23rd October 2008, at 10 a.m. in Giurgiulesti

The Scoping should be undertaken at the initial stage of the Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) development of the road project and prior to finalizing the decisions on the contents. The objective of the "scoping meeting" is to identify the proposed project's potential impacts, what issues are particularly important to focus on, what impacts are already well known and do not need further elaboration, what alternatives should be considered and evaluated, and how consultation will be conducted during and following the EIA/SIA processes.

Comments may be given verbally or in writing at the scoping meeting or be send after by email (silvia_ghiaur@yahoo.com), or by fax (+373 22 748850). Every reasonable effort will be made to meet special needs. The working language will be State language with English translation (interpreter). Individuals who require assistance for accommodations, such as sign language interpreter, to participate in the meeting should contact the Project Office.

Contact:
Ms. Silvia Ghiaur, Project Assistant,
Email: silvia_ghiaur@yahoo.com
tel. +37322 595849, Mobile: +373 797 34277
Address: Bucuriei 12A str, MD 2004, Chisinău.

Yours sincerely,

State Road Administration, Universinj Ltd., Kocks Consult

A.1.2 Scoping Document

Scoping Document
FEASIBILITY STUDY FOR the REHABILITATION and EXTENSION of the ROAD M3 CHISINAU — GIURGIULESTI/ ROMANIAN BORDER
Environmental and Social Impact Assessment

Objective of the Scoping

The objective of the scoping is to obtain the views of agencies, affected groups, stakeholders and NGO's about the Project. Scoping meetings are conducted prior to any decision making. This will ensure that the views of stakeholders are properly taken into consideration in project decision making. The finalization of the environmental and social assessments using the EBRD, WB and MCC guidelines as reference on the screened road sections will ultimately provide the level of information required to determine the scale of environmental / socio-economic impact of the proposed project road activities.

Project sponsor

The Project sponsor is the European Commission, represented by the European Commission delegation in Moldova, for and on behalf of the government of the Republic of Moldova.

Project Overview

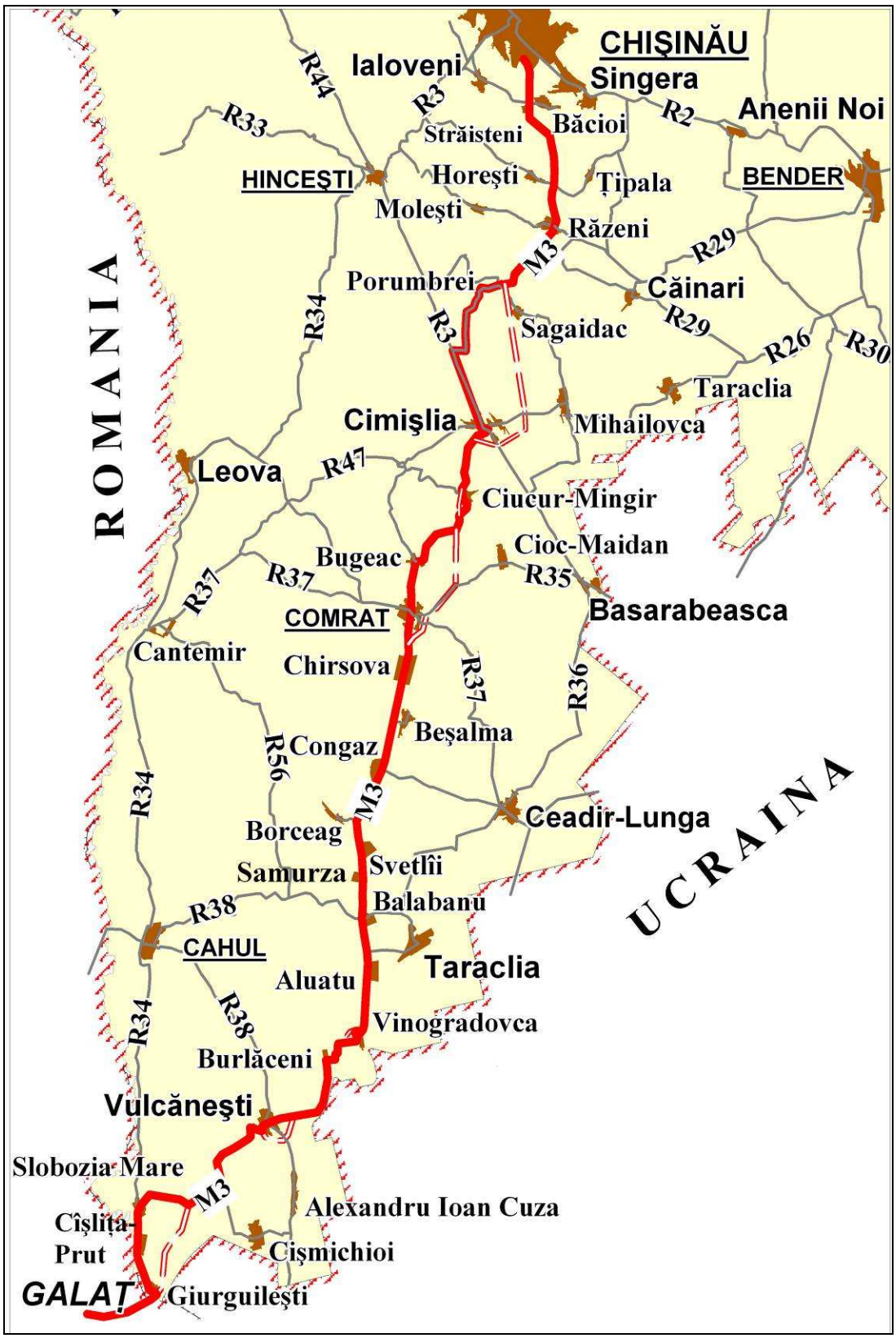
The Moldavian M3 road corridor provides the most important and the shortest link between Chisinau and Giurgiulesti – giving access to the Danube and the Black Sea. In addition, the M3 corridor is an integral part of the European Road E577 Poltova – Kirovograd – Chisinau –Giurgiulesti –Galati – Slobozia. It provides a link within the Trans European Transit Network. Currently, the corridor has partly a high level of degradation and reduced bearing capacity, resulting in axle load restriction and diversion of freight traffic, high transportation cost and subsequently reducing local business opportunities and transit traffic. Figure 1 presents an overview of the study corridor.

The construction and rehabilitation of the road M3 Chisinau-Giurgiulesti will develop regional and international transport. The rehabilitation and partial realignment of the first section of the road (Chisinau-Cimislia) will improve the transport connections avoiding inhabited areas and substantially decrease transport cost. The rehabilitation of the second (existing) part of the road Cimislia-Giurgiulesti is very important, especially since current road conditions for the traffic intensity are very poor. Obviously, the rehabilitation and reconstruction of the whole road will facilitate trade, transport, industry, and tourism development and strengthen access to agricultural markets in the region and will be a prerequisite for secure transportation connecting the country's centre with the regions.

Corridor Segments

The composition of the corridor segments vary widely from a Category I, four lane concrete motorway in the very north - with incomplete sections- to Category III sections in the middle of the corridor, to politically necessitated routing of the M3 corridor on local roads (Category IV) in the south. Previous studies identified a number of M3 extensions and bypasses along the corridor.

Figure 1 Corridor Overview



The first 34 km of the road were constructed in the period 1985-1995 and earth works were carried out for the next 8 km of the road. The 4-lane section is categorised as Category I and was built to carry out a maximum axle-load of 10 tones. It has a concrete surface. For the following 3 sections from km 34.5 to km 61.3, realignment has been proposed and started in 1989 but beside land acquisition and some earthworks, no significant activities have been undertaken for the construction of this 4-lane road section.

The total length of the Cimislia – Giurgiulesti - Section is 149.6 km and most parts of this section were built in the early eighties except for the so called Bolgrad Bypass. The Bolgrad Bypass (Ukraine) is 15.5 km in length and is a result of the political changes in the past. As the original M3 Road was passing through Bolgrad, which is now a part of the independent Ukraine), an alternative to avoid border crossing twice was created within a short period and under lack of funds. This current carriageway is extremely narrow with sharp (90°) curves and is practically useless for heavy truck traffic.

Currently, the paved section of the road varies in condition from adequate to poor with lengthy sections subject to cracking and deformation and more limited sections subject to potholing and rutting.

Necessity for Environmental / Social Assessment and legal requirements

Over most of the sections the Project will be mainly confined to the existing M3 Road. For those sections the Project will not entail significant additional impacts on the natural environment during and after construction. However social impacts may arise in villages where the existing road is passing through with lots of turns and providing technical parameters that do not correspond to the required safety levels, travel time, etc.

Therefore at several sections of the corridor bypasses are investigated as alternatives. These alternatives would require the construction of new road sections. If some of these alternatives should be realized the Project would, at least in these sections have properties of a Category A impact. In such case, there is the necessity to conduct an Environmental Impact Assessment (EIA) as well as prepare a Resettlement Action Plan.

Legal requirements for EIA/SIA are laid down in the Moldovan Law and the environmental and social impact assessment guidelines of the donor, the European Bank for Reconstruction & Development (EBRD).

Potential Environmental and Social Impacts

Potential environmental and social impacts refer to the construction and to the operation phase of the Project. They occur mainly in road sections where bypasses are considered as alternatives and comprise the physical, human and biological environment.

There are no protected areas located within the route alignment. Based on our initial field findings special attention will have to be given to the following impact categories:

- Soil and slope stability.
- Potential occurrence of landslides in areas of scarce vegetation and on cut slopes.
- Surface and ground water quality and quantity
- Impacts on wild life – fauna and flora especially endangered and other species
- Emissions to air

- Noise emissions
- Impacts on irrigation systems and on agricultural used areas
-

Environmental Management Plan for Mitigation of Impacts

An Environmental Management Plan (EMP) will be prepared. The EMP will describe the various measures proposed under the Project, designed to avoid or at least to mitigate adverse environmental impacts that may result from the Project. The EMP considers all phases of the Project cycle, namely the detailed design, construction and operational phase.

Examples of mitigation measures implemented within the environmental management and resettlement plans are:

- Top soil protection: Temporary storage of removed top soil within designated area, erosion protection to prevent top soil loss during construction phase, reuse of top soil on embankments.
- Air quality measurements
- Water quality measurements
- Drainage design to avoid impact on surface waters
- Resettlement and land compensation measures

Alternatives

Various bypasses are investigated under this Project. These alternatives divert from the existing alignment and result in sections that would have to be newly constructed and would therefore require special attention within the Environmental Management Plan.

Public Consultation and Disclosure Plan

Community involvement is important in order to understand the nature and extent of potential impacts, especially socio-cultural impacts, and to assess the suitability and acceptability of mitigation measures associated with the Project. We will try to consider comments and suggestions we receive on the Project as far as it is technically and economically feasible. The Draft EIA/SIA documents will be made available for the public. The public will have 30 days to comment.

Table of Content of the EIA

The EIA will be structured along the following lines:

- Executive Summary
- Introduction
- Policy, Legal and Administrative Framework
- Study Methodology
- Description of the Proposed Project
- Results of Scoping
- Environmental Baseline
- Environmental Impacts and Mitigation
- Alternatives
- Environmental Management Plan
- Public Consultation and Disclosure

- Appendices:
  - o List of persons who prepared and contributed to the EIA

- Records of coordination and consultation meetings and events
- Environmental and Social Clauses for Bids and Specifications
- References
- EIA Terms of Reference
- Other, as appropriate

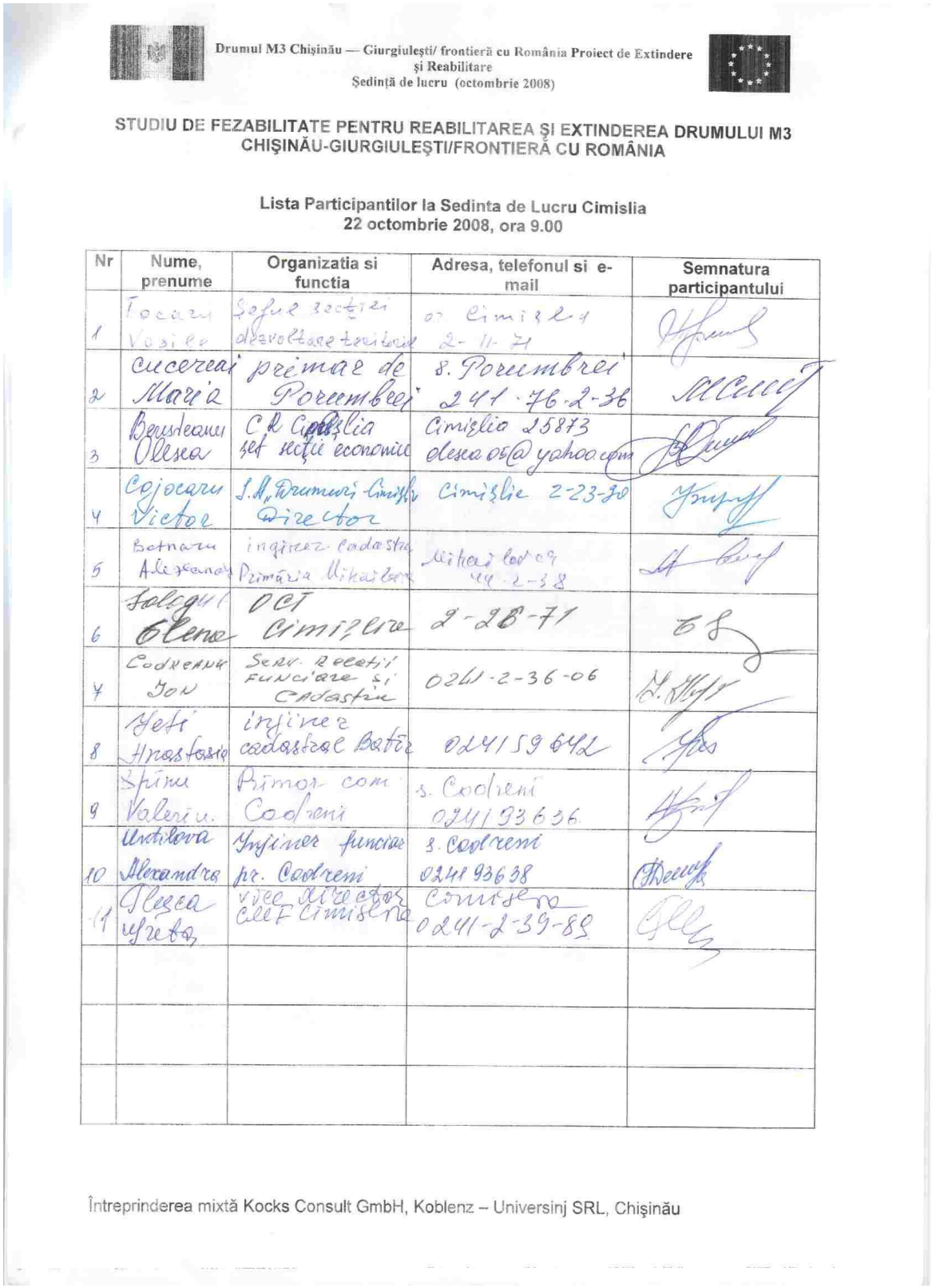
Table of Content of the SIA

The SIA will be structured as follows:

- Executive Summary
- Introduction
- Policy, Legal and Administrative Framework
- Study Methodology
- Description of the Proposed Project
- Description of the Socioeconomic Conditions of the Project Area
- Description of Potential Social, Resettlement and Land Acquisition Impacts
- Description and Documentation of Results of Consultation and Participation Process
- Description of Mitigating Measures – Resettlement Action Plan
- Conclusions and Recommendations

- APPENDICES
  - References
    A Checklist and Survey Forms
      - A1 Key Informant Survey
      - A2 Social and Land Acquisition Impact Assessment Checklist Form
  - B Consultation Results
      - B1 Minutes of Meeting
      - B2 Pictorials
  - C Terms of Reference for RAP Preparation

A.1.3 Sign-in Sheets Scoping Meetings



Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
Şedinţă de lucru (octombrie 2008)

STUDIU DE FEZABILITATE PENTRU REABILITAREA ŞI EXTINDEREA DRUMULUI M3 CHIŞINĂU-GIURGIULEŞTI/FRONTIERA CU ROMÂNIA

Lista Participantilor la Sedinta de Lucru Cimislia
22 octombrie 2008, ora 9.00

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Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
Şedinţă de lucru (octombrie 2008)

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22 octombrie 2008, ora 9.00

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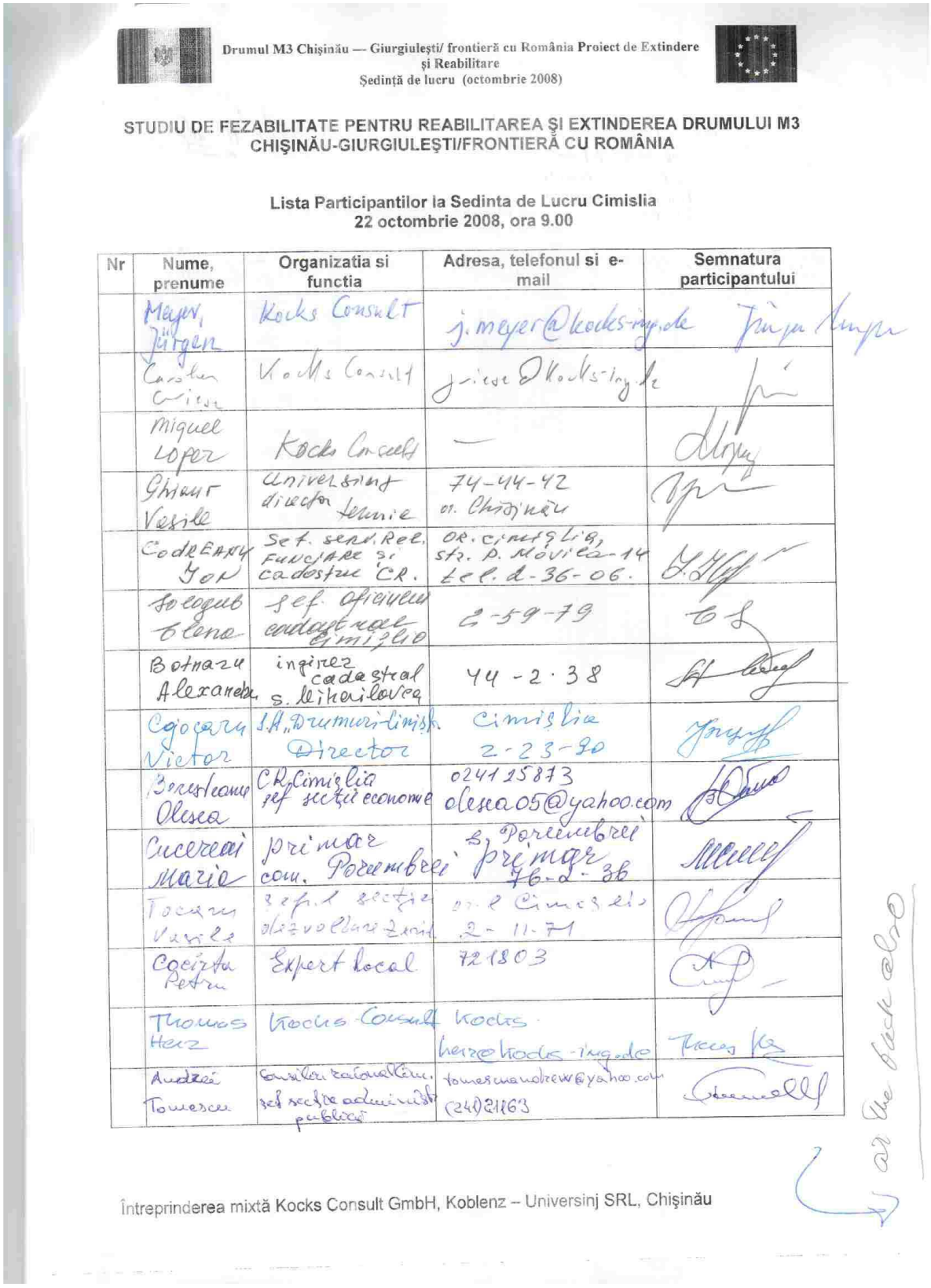

Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
Şedinţă de lucru (octombrie 2008)

STUDIU DE FEZABILITATE PENTRU REABILITAREA ŞI EXTINDEREA DRUMULUI M3 CHIŞINĂU-GIURGIULEŞTI/FRONTIERĂ CU ROMÂNIA

Lista Participantilor la Sedinta de Lucru Cimislia
22 octombrie 2008, ora 9.00

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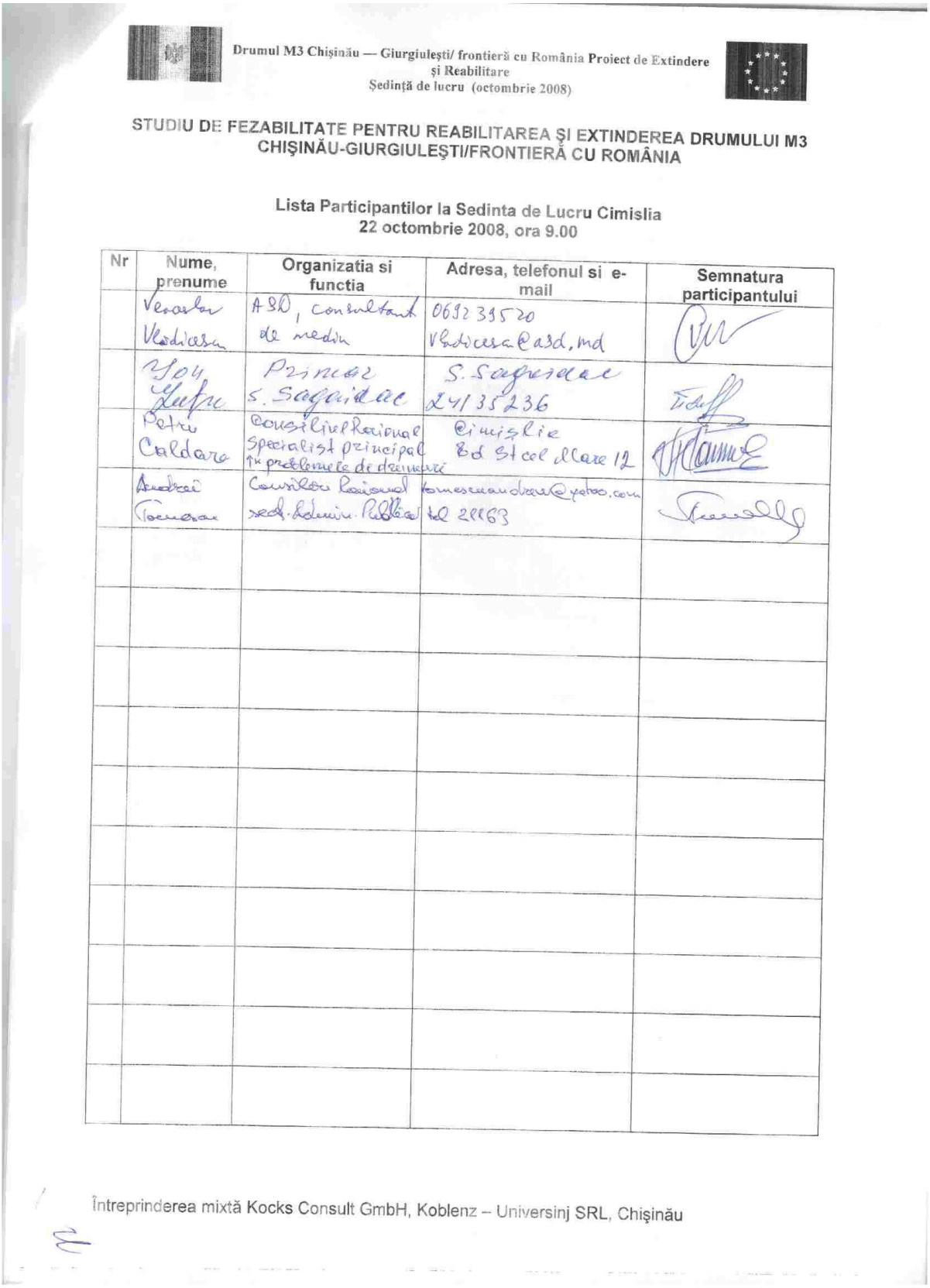

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Lista Participantilor la Sedinta de Lucru Cimislia
22 octombrie 2008, ora 9.00

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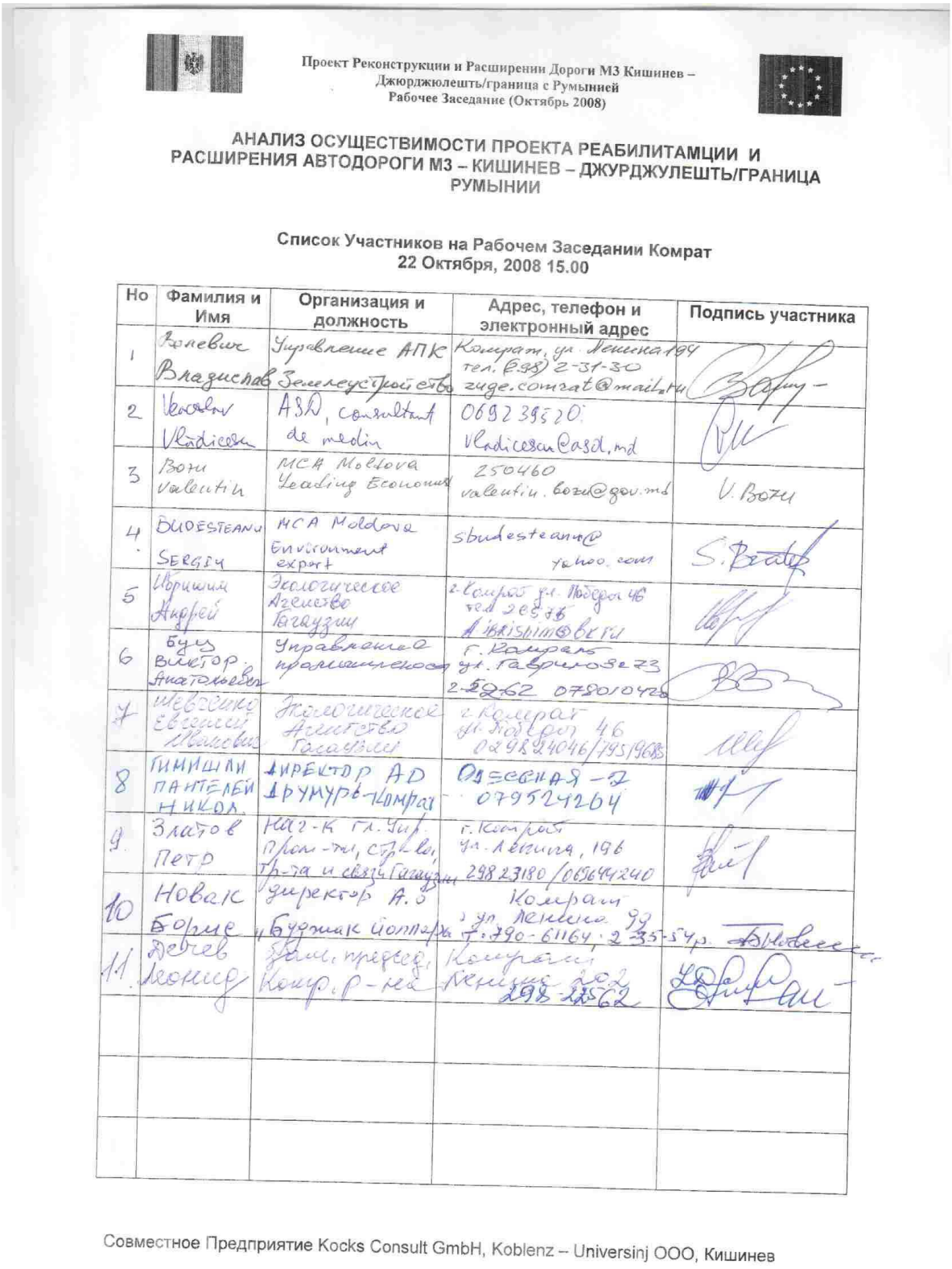

Проект Реконструкции и Расширении Дороги М3 Кишинев – Джюрджюлешть/граница с Румынией
Рабочее Заседание (Октябрь 2008)

АНАЛИЗ ОСУЩЕСТВИМОСТИ ПРОЕКТА РЕАБИЛИТАМЦИИ И РАСШИРЕНИЯ АВТОДОРОГИ М3 – КИШИНЕВ – ДЖУРДЖУЛЕШТЬ/ГРАНИЦА РУМЫНИИ

Список Участников на Рабочем Заседании Комрат
22 Октября, 2008 15.00

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10	Новак Борис	директор А.З "Буджак Цоттаж"	Комрат ул. Ленина 99 т: 790-61164, 2-33-54 р.	
11	Дечев Леонид	Зам. предс. Комр. р-на	Комрат Ленина 202 298-22562	

Проект Реконструкции и Расширении Дороги М3 Кишинев – Джюрджюлешть/граница с Румынией
Рабочее Заседание (Октябрь 2008)

АНАЛИЗ ОСУЩЕСТВИМОСТИ ПРОЕКТА РЕАБИЛИТАМЦИИ И РАСШИРЕНИЯ АВТОДОРОГИ М3 – КИШИНЕВ – ДЖУРДЖУЛЕШТЬ/ГРАНИЦА РУМЫНИИ

Список Участников на Рабочем Заседании Комрат
22 Октября, 2008 15.00

Но	Фамилия и Имя	Организация и должность	Адрес, телефон и электронный адрес	Подпись участника
1	Сапунжи Сергей	Примэрия Примар	с. Кирсово 5-12 2-36	[signature]
2	Петров Юрий	ГУПСТиС специалист отдела строительств	м. Комрат 2-23-01	[signature]
3	[illegible] Николай [illegible]	Председатель совета д-т ОДОГ [illegible]	г. [illegible] ул. Голощапова 2к 2-44-37	[signature]
4	Камбур Иван Михайлович	Главное Управление Образ-ия Зам. Начальника	067124404 0(298)22748 cambur.08@mail.ru	[signature]
5	Ghiaur Vasile	UNIVERSINJ director Tehnic	069148746 022 744412	[signature]
6	Carsten Griese	Kocks Consult		[signature]
7	Jürgen Meyer	Kocks Consult	j.meyer@kocks-ing.de	[signature]
8	Ala Demiseenco	Universinj	069705667 dallat@ck.md	[signature]
9	Petru Cocirta	Expert	Chisinau 72 18 03	[signature]
10	Andrei Cuculescu	MTGR Şef Direcţie	Chisinău 251120	[signature]
11	Thomas Herz	Kocks Consult	herz@kocks-ing.de	[signature]
12	Miguel Lopez	Kocks Consult	→	[signature]

Совместное Предприятие Kocks Consult GmbH, Koblenz – Universinj ООО, Кишинев

Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
Şedinţă de lucru (octombrie 2008)

STUDIU DE FEZABILITATE PENTRU REABILITAREA ŞI EXTINDEREA DRUMULUI M3 CHIŞINĂU-GIURGIULEŞTI/FRONTIERĂ CU ROMÂNIA

Lista Participantilor la Sedinta de Lucru Giurgiulesti
23 octombrie 2008, ora 10.00

Nr	Nume, prenume	Organizatia si functia	Adresa, telefonul si e-mail	Semnatura participantului
1	Alexandru Caleudari	Şef secţie Ştefan Cel Mare Cahul	Cahul, Republicii, 20 tel: 299.2.24.66	
2	Tatiana Munteanu	ICS "Danube Logistics"	Portul Internaţional Liber Giurgiuleşti tel: 293 71 599; 79702029	
3	Bogdan MARTIN	ICS DANUBE LOGISTICS SRL	P.I.L.G.	
4	Veaceslav Vladicescu	ASP, specialist mediu	069233520, VladicescuOasd.md	
5	Bozu Valentin	MCA Moldova Economist	280460 valentin.bozu@gmail	
6	SERGIU BUDESTEANU	MCA Moldova Env. consultant	sbudisteanu@yahoo.com	
7	Nicolae Tornea	Primar Satului Giurgiuleşti	Primăria S. Giurgiuleşti tel 0293 71-2-36	
8	Sevcenco Maria	Direcţia Generală Învăţământ, Cahul prefect	Cahul Florilor 35/1 tel 299 22332	
9.	Zaza Vladimir	Rezervaţia Naturală "Prutul de Jos" Cahul Rezerv. Ştiinţific	R.M. Moldova Cahul s. Slobozia Mare 0293 60-159	
10.	Nuţă Aliric	ÎMCRDSL Cahul director	or. Cahul str. Ştefan cel Mare 3-44.62	
11	Tornea Cristina	L.T. "Mihai Sadoveanu" elevă	sat. Giurgiuleşti str. Hotarnicilor nr. 11	Tornea
12	Cîşlăeanu Valeriu	L.T. M. Sadoveanu Org. Echipa Biodiversităţii elev	satul Giurgiuleşti str. Şcolnicească nr. 9	Cîşlăeanu
13	Bratco Natalia	L.T. "M. Sadoveanu" membru al echipei Biodiversităţii	s. Giurgiuleşti str. Ţinutului, nr. 59 0293 71101	Bratco
14	Siminovici Doina	membră a echipei "Biodiversitate"	s. Giurgiuleşti str. Porumbescu, nr. 14. 06822 0216	Siminovici

Întreprinderea mixtă Kocks Consult GmbH, Koblenz – Universinj SRL, Chişinău

Drumul M3 Chișinău — Giurgiulești/ frontieră cu România Proiect de Extindere și Reabilitare
Ședință de lucru (octombrie 2008)

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Lista Participantilor la Sedinta de Lucru Giurgiulesti
23 octombrie 2008, ora 10.00

Nr	Nume, prenume	Organizatia si functia	Adresa, telefonul si e-mail	Semnatura participantului
	Nucă Mirie	JMCRDSC Cahul	or. Cahul str. Sprin 90 34462	
	Lazăr Vladimir	Rezervația Naturală „Prutul de Jos"	Moldsilva R.M. c-nul Cahul s. Slobozia Mare 60-159	
	Grecenco Maria	RDŞ Cahul metodist	Or Cahul str. Florilor 39/1 22332	
	Nesterenco Dumitru	L.T. „Mihai Sadoveanu" membru „Erasmus" elev	s. Giurgiulești CM c-nul Cahul 71-283 str. Independenței 6/a	
	Bleico Dumitru	L.T. „M. Sadoveanu" membru „Erasmus" elev	s. Giurgiulești r. Cahul str. Pionierilor 71-1-61	
	Grejdeanu Victoria	Director al LT. „M. Sadoveanu"	s. Giurgiulești str. Pionierilor 71-2-60	
	Neculseanu Olga	Profesor LT. „M. Sadoveanu	s. Giurgiulești str. Societății.	
	Călin Adam	Primar s. Alnaru r. Taraclia	s. Alnaru r. Taraclia 029435-0-14	
	Sava Tanasi	IE Taraclia șef	r. Taraclia 067117577	

A.1.4 Received Comments

Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
Şedinţă de lucru (octombrie 2008)

STUDIU DE FEZABILITATE PENTRU REABILITAREA ŞI EXTINDEREA DRUMULUI M3 CHIŞINĂU-GIURGIULEŞTI/FRONTIERĂ CU ROMÂNIA

Bine ati venit la Sedinta de Lucru M3!
Aportul dvs este necesar si apreciat, de aceea va rugam sa utilizati acest formular pentru comentarii si intrebari in timpul sedintei, sau dupa sedinta il puteti trimite la adresa: str. Bucuriei 12 A, Chisinau MD 2004, sau la adresa electronica silvia_ghiaur@yahoo.com

Formular pentru comentarii

Region	Cimislia
Name, surname	Mardari Haralambie
Organization and function	Troitcoe Town Hall, Land Engineer
Address, telephone and e-mail	Troitkoe Town Hall, Cimislia region Telephone: 50-2-36
When will be rehabilitated the road Cimislia-Causeni?	

Region	Cimislia region, Codreni village
Name, surname	Spinu Valeriu
Organization and function	Mayor of Codreni village
Address, telephone and e-mail	Codreni village, Cimislia region Telephone: 0241 936 36
Questions	
Will the road Sagaidacul Nou-Satul Nou be part of the project? There are 8 bridges built, it is only necessary to straighten and cover with gravel of 4cm 400m length.	

Region	Cimislia
Name, surname	Badan Tatiana
Organization and function	Selemet village Mayor
Address, telephone and e-mail	Selemet village, Cimislia region Telephone: +373-241 39 236 Tatiana_badan@mail.ru
Comments	
It is a necessity to make the consultation of the project for rehabilitation and extension of M3 road. This road is welcomed for Cimislia town as well as for Porumbrei, Iurievca and Valea-Perjei villages	
Questions	

Întreprinderea mixtă Kocks Consult GmbH, Koblenz – Universinj SRL, Chişinău

Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
Şedinţă de lucru (octombrie 2008)

1) To organize project coordination and consultancy with Local Public Administration
2) The quality !!! of the roads
3) Environment protection, the monument Valul lui Traian
4) Implementing
5) Traffic signs for speed limitation and indicators

Region	Cimislia
Name, surname	Eni Ion
Organization and function	Selemet Town Hall, Land Engineer
Address, telephone and e-mail	Selemet village, Town Hall Telephone: 39-8-36
Comments	
The bypass roads are necessary to ease the transport traffic (especially the heavy traffic) on the Cimislia town territory and the villages near the route. It is necessary to protect the environment, from the ecological point of view, the social-economical development of the villages near the route.	
Questions	
Will it be build as it is in the project with the bypass of Porumbrei, Sagaidac, Cimislia on the lands of Porumbrei-Sagaidac-Satul Nou-Selemet-Mihailovka-Cmislia owned by the town hall?	

Region	Cimislia
Name, surname	Mihail Vasilache
Organization and function	Suric Town Hall, Land Engineer
Address, telephone and e-mail	Suric village, Cimislia region Telephone: 50-2-38, 52-2-15

Region	Cimislia
Name, surname	Ghenciu Alexandru
Organization and function	Suric Town Hall, Mayor
Address, telephone and e-mail	Suric village Telephone: 52-2-38, 52-2-58
Comments	
Suric village is at 1.8 km from the place where the route will pass, the habitants of the village ask you to assist them at least in the option of having an access road to this route, because Suric village is away from all the central roads.	

Region	Cimislia
Name, surname	Bancov Stefan

Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
Şedinţă de lucru (octombrie 2008)

Organization and function	
Address, telephone and e-mail	Stefan cel Mare Boulevard 14, Cimislia town Telephone: 0241-231-57
Comments	
1) To bypass Cimislia town and Ciucur Minjir village according to the project that was developed in 1990.	

Region	Cimislia
Name, surname	Tampita Mihail
Organization and function	Environmental Inspection, Inspector
Address, telephone and e-mail	Stefan cel Mare Boulevard 14, Cimislia town Telephone: 0241-2-22-53
Questions	
The top soil shall be used	

Region	Cimislia
Name, surname	Pavel Teaca
Organization and function	Preventive Medicine Center, Chief Medical Officer
Address, telephone and e-mail	Cimislia, Cetatea Alba Street 27 Telephone: (241) 22778 E-Mail: cnperm@mtc-cm.md
Comments	
In the plan of the social impact on the population health it is highly necessary that the designed route shall bypass all the localities near this route.	

Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
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STUDIU DE FEZABILITATE PENTRU REABILITAREA ŞI EXTINDEREA DRUMULUI M3 CHIŞINĂU-GIURGIULEŞTI/FRONTIERĂ CU ROMÂNIA

Bine ati venit la Sedinta de Lucru M3!
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Formular pentru comentarii

Region	Comrat
Name, surname	Novac Boris
Organization and function	Director of „Bugeac Iollari"
Address, telephone and e-mail	Comrat, Lenin Street 99
Comments	
It is a very important meeting. It is necessary to plan the bypass of the localities: Comrat, Chirsova, Congaz, Svetlii. There are benefits for that:	
1) cheaper state land	
2) decrease of the emissions in localities	
3) there is the existent road, 7km Comrat bypass	
4) decrease of the road accidents, saving the lives of many people	
22.10.08	

Region	Comrat, Gagauzia
Name, surname	Cambur Ivan
Organization and function	Gagauzia Educational Administration, Deputy Chief of GUO
Address, telephone and e-mail	Cambur.08@mail.ru Mobile: 067124404 Office: 0298 22748
Comments	
We need to take into account all the social-economical and environmental factors of the impact	

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Region	Comrat region, Chirsova village
Name, surname	Saidji Serghei
Organization and function	Town Hall Mayor
Address, telephone and e-mail	Chirsova village, telephone: 51-2-36

Comments

The project must take into account the densely populated localities, the narrow road, the lack of drainages. There are proposals to develop the project taking into account the bypasses, especially that there is this possibility in Chirsova village. The bypass should go on the flood-land of Ialpug river, especially that the lands are administrated by the town hall.

Questions

What are the terms of finalising this project?

Region	Comrat
Name, surname	Zlatov Petr
Organization and function	The Chief of the Industrial and Construction Management
Address, telephone and e-mail	Comrat, Lenin Street 196, 298-2-31-80, 26881 Mobile: 069644240

Comments

The priority is to plan the bypass of Comrat town, and the villages Chirsova, Congaz, Svetlii, as well as Vulcanesti town. It is necessary a further collaboration.

Region	Taraclia, Aluatu village
Name, surname	Calin Adam
Organization and function	The mayor
Address, telephone and e-mail	Aluatu village Mobile: 079729904

Comments

The construction and rehabilitation of the road M3 is necessary and I support this project, but it will not be efficient without a bypass of the villages, densely populated

Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
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STUDIU DE FEZABILITATE PENTRU REABILITAREA ŞI EXTINDEREA DRUMULUI M3 CHIŞINĂU-GIURGIULEŞTI/FRONTIERĂ CU ROMÂNIA

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Formular pentru comentarii

Region	Cahul region, Giurgiulesti village
Name, surname	Cristina Tornea
Organization and function	Mihai Sadoveanu High school, 10th grade
Address, telephone and e-mail	Giurgiulesti village, Granicerilor street 17 029371-146 Cristinka_tornea@yahoo.com
Comments	
As a future citizen of the village and as a beneficiary of the highway Chisinau-Giurgiulesti, I agree with its construction. Being a whiteness of different constructions and projects it would be a benefit for our village and for its economical development and the construction of the highway.	
Questions	
1) What warranties do you give us that in 2017 this highway will be constructed?	
2) The road R34 will be also rehabilitated simultaneously with the M3 highway construction?	

Region	Cahul region, Giurgiulesti village
Name, surname	Neculseanu Andrei
Organization and function	Mihai Sadoveanu High school, 12 grade
Address, telephone and e-mail	Comrat, Lenin Street 99
Comments	
At this meeting I was not satisfied with the answers, the answers were abstract, nothing clear, We would like to find out something precise. I think that an international project should contain very precise information, not during the construction to have some doubts, of resettlement some social places.	
Questions	
1) Why is this highway rehabilitated?	

2) The land owners will have a financial benefit or they will be abolsihed by law, exactly like in the railway project?

Region	Cahul region, Giurgiulesti village
Name, surname	Siminovici Doina
Organization and function	Member of the "Biodiversity" team, "Mihai Sadoveanu" High School
Address, telephone and e-mail	Giurgiulesti village, Cotiubinschi street 14, Mobile: 068220214
Comments	
As a democrat citizen, who aspires to development, I agree and I support this project, but I think that the number of the accidents will increase, this road endangers many people's lives. Other comments and questions I will address at the next meeting, when there will be answers for more questions.	
Questions	
Why it is not constructed a road that will bypass all the localities?	

Region	Cahul region, Giurgiulesti village
Name, surname	Bratco Dumitru
Organization and function	"Mihai Sadoveanu" High school
Address, telephone and e-mail	Giurgiulesti village, Tineretului street 71-1-01
Comments	
I agree with the construction of this highway, but I did not like the answers that you gave. You did not say anything precise; we would like to find out more information about the villages out of the highway.	
Questions	
1) Will the administration of our village contribute to the construction of this highway?	
2) The road R34 will be rehabilitated again?	
3) In 2017 we will be able to travel on this highway without problems?	

Region	Cahul region, Giurgiulesti village
Name, surname	Cirjaleanu Valeriu
Organization and function	"Mihai Sadoveanu" High School
Address, telephone	Giurgiulesti village, Comsomolist street 9, 0293 71-2-04,

Drumul M3 Chişinău — Giurgiuleşti/ frontieră cu România Proiect de Extindere şi Reabilitare
Şedinţă de lucru (octombrie 2008)

and e-mail	rikc'sjawa@yahoo.com

Comments

As a habitant of the Giurgiulesti village, I am very interested in the social-economical development of this village. This is why I approve your project, because it is a big necessity for habitants, also for the drivers. The rehabilitation of the highway will have positive consequences not only for the Giurgiulesti village but also for the Republic of Moldova.

Questions

1) Will the trees be planted along the highway?

2) Will the quality of the road reach the European standards?

Region	Cahul
Name, surname	Sevcenco Maria
Organization and function	General Educational Department, Methodist
Address, telephone and e-mail	Cahul, Florilor street 39/1 Telephone: 22332 and 26560

Comments

I consider that the highway is welcomed and it is a benefit for our country and for the villages that it's crossing. I liked that the public opinion is studied and that it was promised that the proposals will be taken into account.

Questions

What will happen with the national roads? Will be the historical monuments taken into account? Will be the fences for animal safety build?

Region	Cahul region, Giurgiulesti village
Name, surname	Bratco Natalia
Organization and function	"Mihai Sadoveanu" High School, member of "Biodiversity" team
Address, telephone and e-mail	Tineretului Street, Giurgiulesti village Telephone: 71-1-01

Comments

As a future habitant of Giurgiulesti village, in 2015, I approve the construction of this international road M3 Chisinau-Giurgiulesti, but with the bypass of the localities, not directly on the national road, because this leads to fissures on the houses, high noise level, and a disturbed sleep. The bypass of the localities will have a benefit for our village.

Questions

1) What is the warranty that in 2017 this project will be finalised?

2) The international road M3 will be rehabilitated, but will be the national road R34 rehabilitated, because now the heavy trucks are crossing it?

A.1.4 Summary of Issues and Comments Made During the Consultations

Date	District Visited	Persons/Groups Met	Expressed Appreciation	Concerns/Issues Raised	Comments/Remarks
22 October 2008 – 10 AM	Cimislia-	41 participants (see Appendix 1 for complete list)	In general expressed agreement with the plan to rehabilitate and extend the road as well as look at possibility for construction of the bypass	When will the construction works begin? (Sagaidac Mayor) Concern on the effects of construction: previous construction works partly destroyed the sidewalk and resulted in local flooding of the drainage but no rehabilitation was undertaken. Assurance that measures will be implemented. Porumbrei Mayor) Current traffic going through the municipality of Cimislia posed various hazards to the local population including health risks and safety for children. Bypass is preferred and if route still goes through Cimislia, difficult to support the project. (Chief of Health Protection-Cimislia). Discussed the merits of the proposed bypass and assured the body that there will be no problems encountered in land acquisition as 10 km of the proposed bypass route is already available and ready for the project. (Selemet Mayor) Cited past experiences in road reconstruction where local community and officials were not consulted during design and planning: resulting in local flooding and sidewalk problems after construction; thus additional cost was required to undertake corrective measures. Expressed appreciation for the consultation being done by the project. (Ciucur-Meijir Mayor). Will geodetic survey and cadastral mapping be carried out to ensure that all affected lands are identified as well as the assets therein and important monuments of historical significance and others are protected? Named some villages where these historical sites maybe located. (Cadastral Officer-Cimislia)	Will have to wait for the result of the FS to determine the viability of the investment; then investment decision will have to be made. Only then can the scheduling be fixed. Permanent and temporary impacts resulting from project activities will be identified and fully documented and proposed mitigation measures discussed with all stakeholders. These shall be assessed including cost and included in the program. These issues will be part of the considerations to be incorporated in the feasibility study to investigate options and alternatives and whether bypass is more advantageous overall. Land availability for the proposed bypass route will be a major consideration and will be factored in determining viability. . As matter of policy and procedures followed by this project is to provide safeguard and mitigating measures for negative project impacts. The best way to ensure appropriate response is to ensure participation of concerned and affected stakeholders. Accordingly participatory measures including consultation, information dissemination and others will always be pursued. Cadastral mapping is already being done by the Project in coordination with the Institute of Territorial Development. Affected land parcels within the concerned alignment and road right of way needs will be identified and required area measured. All assets within these parcels will be inventoried and documented in coordination with concerned landowners. Likewise, all affected landmarks, communal assets and historical monuments will be identified and included in the documentation.
				Expressed necessity for consultation with local communities and coordination on various concerns – traffic, design, environment, project scheduling- with local authorities. (Codreni Mayor) Necessity of bypass construction to protect the communities on existing routes against traffic problems, pollution hazards, etc. Will the road bypass be built on the lands owned by the municipality (Selemet Town Hall Land Engineer) Need for connectivity and access road of villages (eg. Suric village traversed by the corridor (Suric Mayor) Health risks and environmental impacts should be major	Financing institutions requires that certain procedures in the provision of safeguard measures are complied with such as the conduct of scoping meetings, consultations, and coordination to ensure the participation of concerned stakeholders. Use of public land will be advantageous to the project since it will minimize cost and avoid the pains of private land acquisition. The FS will take this into consideration. Connectivity and ensuring access of the villages nearby will be one of the considerations in the socioeconomic issues investigated during the feasibility study. The EIA and SIA will look closely into these issues and propose mitigating measures to be presented to the community as well.

				issues investigated in the FS. (Cimislia Environmental Officer)	
22 October 2008 – 3PM	Comrat, UTA Gagauzia	23 participants (see Appendix for complete list)	Participants express the need for the project to go ahead but should be undertaken in close coordination with the authorities of the autonomous region	What options are proposed and will be pursued in the road rehabilitation and reconstruction? Impact on the environment and health and other social factors and risks should indeed be considered. But then all options would have these considerations and risks. If all are taken into considerations, no option maybe available. As the road is important for regional, national and international development, the project especially the bypass route should be pursued. The Experts can ensure the mitigating measures to address risks and impacts. (Basarabeasca Mayor) Land acquisition is not an issue on existing road since the ROW is wide enough to accommodate expansion. However, on proposed bypasses, land will have to be acquired for the ROW. In Cimislia, the Regional Authority has kept the area within the proposed bypass as public land; these have not been privatized. For the proposed Comrat Bypass the land situation in the proposed alignment still needs to be determined. Issue on the Comrat Bypass which was started earlier - need for connection from Bugeac to Comrat (Bugeac Raod Dept. – Director) Need to pursue land acquisition to ensure the connection to Comrat; future traffic intensity merits the completion of the Bypass. Cited potential justification for the proposed bypass in Chirsonova given the sharp curve and the density of population in the area traversed by the current route with all risks and hazard posed by traffic due to location of social facilities closed to the road, limited expansion area available with all the public utilities using the limited space. (Chirsova Mayor) Question on the surface type for the road and if purely asphalt , fear that during summer season the surface will soften and will quickly deteriorate (Construction Specialist – Comrat) Lands along the route considered for the bypass are not economically useful and valuable. One benefit in pursuing the bypass is that the current area is being used as dumpsite for garbage. During construction of the bypass,	The Project is at the stage of reviewing various alternatives including the previous proposals. At this point it is difficult to say which are the preferred alignments as considerations including the technical, social, economic, environmental, land acquisition and financial factors are still being studied and assessed and the project is still in progress. The Project follows certain policies and procedures to conform to the country and funding institutions' policies and regulations on safeguard measures and ensuring project viability. Accordingly, options and alternatives must be evaluated. Only then can decisions be justified. Comrat representatives believe that there will be no major problems in land acquisition as the land within the area of the proposed bypass are not of the best type and they are mostly grassland. The merit of the Bypass will be reinvestigated and data will be updated based on the current and projected traffic volume based on development activities taking shape in the region as well as the national and international requirements. The FS will look closely and review justifications for various options. Construction procedures and materials used will require meeting international standards and that quality will be assured given close supervision and monitoring. Design and safeguard measures will conform to international standards and regulations. Assurance that the Project will maintain a standard of excellence starting from the design stage with Kocks and Universinj's involvement. The safeguard measures will be fully developed to conform to international and national policies and regulations and that implementation will be properly supervised and monitored in accordance with expected guidelines. Based on the response of MCC's Chief Economist, if the section from Comrat to Giurgiulesti including the proposed bypasses is found economically feasible, financially viable, environmentally and socially sound then a Compact agreement will be executed between the GOM and the MCC for financing of the section and within 5 years after approval the section may already be developed.

				the cleaning up will be required and will benefit the community accordingly. Commented that he has not remembered times when EIA scoping had been conducted (Head of Envi and Eco Dept. Comrat. The Project is considered vital and of importance to the development of Comrat and the autonomous region. Suggested that local people be also hired during construction for employment purposes and that he expects that the Project will pursue a standard of excellence; and after the design posed question as to when construction will start.	
				Discussed the benefit of the bypass option and the need to take into account all environmental and social impacts (Director, Roads Dept). Choosing the bypass route will avoid densely populated areas and narrow road where expansion will have major social impacts and avoid impacts on private lands as municipal public land is available. Design should incorporate other features like provision of drainage. (Chirsova Mayor) Pointed out the merit of the proposed rehabilitation of the M3 and that it would be more effective and efficient with the construction of bypasses (Taraclia Mayor) Pointed the necessity for close collaboration of the project with the local authorities (Chief of Industrial and Construction Management – Comrat)	Thus the objective of the scoping meetings. Objective of the Scoping meeting is to generate input of all stakeholders specially the local communities and the authorities on what they perceive as best for them and generate suggestions which could be advantageous to the project and will be incorporated in the FS.
23 October 2008 – 10AM	Giurgiulesti, Cahul	29 participants (see Appendix for complete list)	The Giurgiulesti mayor was initially negative about the consultation process but eventually appreciated the benefit of the scoping activities. Mayor of Aluatu, Taraclea appreciated the invitation to participate in the meeting and the representative of the International Ports Authority	Impact of the proposed alignment and bypasses should also consider the villages and communities. Cited benefit that the Giurgiulesti community will derived when road is rehabilitated or bypass pursued. He feels that the bypass is more beneficial to the community and the environmental and social impacts will be minimal. (Giurgiulesti Mayor) If the proposed alignment is considered part of the international route then the bypasses should be pursued and the design and construction should conform to international standard. (International Port Representative - Giurgiulesti) Experience with Giurgiulesti Port, that because it was considered of international and national importance it was pursued without adequate consultations and participation of the local communities. Hope that the Project will not follow the course of the Port and Railway development experiences; what about the connection of the existing	The background of the project was provided in the context of the national road strategy and how this section supports the overall development plan and program. While the project has major macro development objectives, the micro impacts and benefits are also being considered; EBRD, WB and MCC provide specific guidelines that must be followed for projects being considered for financing. To ensure that all factors are considered participation of all stakeholders is generated and comments and suggestions are duly incorporated in the design and planning including measures to protect the environments, the livelihood and social interest of the local population. Accordingly, the environmental and social assessment starts with scoping meetings to determine due considerations which must be investigated during the feasibility stage and design phase of the project. Financing institutions have these rigorous procedures for review and project development process that must be conformed with. If the review and investigation as well as FS result in the technical, economic, social, environmental and financial justification of the project, then there is no reason not to pursue it given the interest of some identified donors to finance it. Project information will follow various ways and procedures: Records of the results of the consultation will be made available and project status will be provided as well for comments and suggestions. The telephone numbers and

			expressed appreciation that the Bypass option will be seriously considered as part of the study.	roads to the proposed Bypass – are these being considered? The project may only benefit international and national road users but not for the village population; What will be the process to ensure that the stakeholders are constantly updated on the status of the project. (Representative of the Students - Mihail Sadoveanu High School in Giurgiulesti Comments on the lack of maintenance program for road repairs as well the sidewalks. The need to coordinate the project development and implementation with the local authorities. Specific questions about the trees along the road that will be affected by the rehabilitation activities as well as the need to protect communal resources like spring water and so on during construction. (Cahul Environmental and State Ecology Representative). Expressed support for the project and the consultation process being undertaken to consider public opinion. Questions on what is going to happen to the national road as soon as the M3 is constructed, and whether historical monuments will be protected and that fences for animal safety be built? (Representative of the General Education Dept, Methodist) With the rehabilitation and construction of the M3, will this also include the rehabilitation of the R34 as it is presently being used by heavy trucks? What about the lands in the proposed bypasses traversed by the M3, will the lands need to be expropriated? Member - Biodiversity Team, Mihai Sadoveanu HS.	addresses of project contact persons had been made available in case of additional comments and question and inquiry into the status of the project. Draft EIA/RAP will be subject of additional consultations so that reactions and comments can be incorporated in the final documents. Suggestions of developing a project website will be considered. The EIA and SIA will incorporate the safeguard and protection of places and landmarks of national and historical significance; measures for animal and biodiversity crossing will be incorporated in the technical features of the road design. The FS will investigate the various options for rehabilitation and construction and recommend the best alternative course of action. Financing will be sought for the recommended action as well as appropriate course of action for the other options. Lands for the proposed bypasses will have to be acquired and a Land Acquisition and Resettlement Plan will have to be developed accordingly to ensure that appropriate mitigating measures are included.
23 October 2008 – 10AM	Giurgiulesti, Cahul	29 participants (see Appendix 3 for complete list)	The Giurgiulesti mayor was initially negative about the consultation process but eventually appreciated the benefit of the scoping activities. Mayor of Aluatu, Taraclea appreciated the invitation to participate in the meeting and the representa-	Impact of the proposed alignment and bypasses should also consider the villages and communities. Cited benefit that the Giurgiulesti community will derived when road is rehabilitated or bypass pursued. He feels that the bypass is more beneficial to the community and the environmental and social impacts will be minimal. (Giurgiulesti Mayor) If the proposed alignment is considered part of the international route then the bypasses should be pursued and the design and construction should conform to international standard. (International Port Representative - Giurgiulesti) Experience with Giurgiulesti Port, that because it was considered of international and national importance it was pursued without adequate consultations and participation	The background of the project was provided in the context of the national road strategy and how this section supports the overall development plan and program. While the project has major macro development objectives, the micro impacts and benefits are also being considered; EBRD, WB and MCC provide specific guidelines that must be followed for projects being considered for financing. To ensure that all factors are considered participation of all stakeholders is generated and comments and suggestions are duly incorporated in the design and planning including measures to protect the environments, the livelihood and social interest of the local population. Accordingly, the environmental and social assessment starts with scoping meetings to determine due considerations which must be investigated during the feasibility stage and design phase of the project. Financing institutions have these rigorous procedures for review and project development process that must be conformed with. If the review and investigation as well as FS result in the technical, economic, social, environmental and financial justification of the project, then there is no reason not to pursue it given the interest of some identified donors to finance it.

			tive of the International Ports Authority expressed appreciation that the Bypass option will be seriously considered as part of the study.	of the local communities. Hope that the Project will not follow the course of the Port and Railway development experiences; what about the connection of the existing roads to the proposed Bypass – are these being considered? The project may only benefit international and national road users but not for the village population; What will be the process to ensure that the stakeholders are constantly updated on the status of the project. (Representative of the Students - Mihail Sadoveanu High School in Giurgiulesti Comments on the lack of maintenance program for road repairs as well the sidewalks. The need to coordinate the project development and implementation with the local authorities. Specific questions about the trees along the road that will be affected by the rehabilitation activities as well as the need to protect communal resources like spring water and so on during construction. (Cahul Environmental and State Ecology Representative). Expressed support for the project and the consultation process being undertaken to consider public opinion. Questions on what is going to happen to the national road as soon as the M3 is constructed, and whether historical monuments will be protected and that fences for animal safety be built? (Representative of the General Education Dept, Methodist) With the rehabilitation and construction of the M3, will this also include the rehabilitation of the R34 as it is presently being used by heavy trucks? What about the lands in the proposed bypasses traversed by the M3, will the lands need to be expropriated? Member - Biodiversity Team, Mihai Sadoveanu HS.	Project information will follow various ways and procedures: Records of the results of the consultation will be made available and project status will be provided as well for comments and suggestions. The telephone numbers and addresses of project contact persons had been made available in case of additional comments and question and inquiry into the status of the project. Draft EIA/RAP will be subject of additional consultations so that reactions and comments can be incorporated in the final documents. Suggestions of developing a project website will be considered. The EIA and SIA will incorporate the safeguard and protection of places and landmarks of national and historical significance; measures for animal and biodiversity crossing will be incorporated in the technical features of the road design. The FS will investigate the various options for rehabilitation and construction and recommend the best alternative course of action. Financing will be sought for the recommended action as well as appropriate course of action for the other options. Lands for the proposed bypasses will have to be acquired and a Land Acquisition and Resettlement Plan will have to be developed accordingly to ensure that appropriate mitigating measures are included.

Appendix 2: References

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Annex 3. EMP Framework Environmental Impacts and Possible Mitigation Measures from the Sector Environmental Assessment (2007) for the Moldova Sector Program Support Project

Table 1. Environmental and Social Impacts for Road Construction 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
		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 construction materials
		  • haul roads
		• Damage to soil structure due to traffic of vehicles and storage of construction 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/ transporta-
			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

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
	• Hauling of construction 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 • Construction materials stockpiling • Construction waste disposals • Construction/ rehabilitation of sidewalks in settlements • Establishment of construction camp/ accommodation facilities (sewage facilities, waste disposals, etc.)	tion 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 construction 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	Permanent/ local	• 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 • To provide proper stockpiling of construction materials • Planting / re-habilitation of vegetation (buffer strips) along the roads to minimize spreading of combustion gases/ particulates/ dust, if appropriate • Backfilling and restoration

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
		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		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	**Negative:** • Groundwater pollution due to surface runoff from operating asphalt plant ground • Groundwater pollution due to	Temporary/ Local	• To plan carefully construction works to minimize impact on water resources • Minimize collection of water and mud, where possi-

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
	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 vehicles, machinery, etc./ hauling of construction 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	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 con-		ble, 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 construction materials • Stockpiles of construction materials should be covered with fabric or other materials to prevent/ mitigate contaminated runoff • To provide proper stockpiling of construction 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 being washed away by surface run-off/ arrange interception

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
	bitumen • Construction materials stockpiling • Construction waste disposals • Establishment of construction camp/ accommodation facilities (sewage facilities, waste disposals, etc.)	nected with accommodation facilities during road rehabilitation/ improper sewage facilitates	Permanent/ local	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 ac-

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
		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		commodation/ 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 construction materials and construction wastes	**Negative:** • Emissions from mobile/ statutory operating asphalt plant • Air pollution by components of combustion gases (CO_2, NOx).	Temporary/ Local	• To plan carefully construction works to minimize air and acoustic pollution • Control construction methods and used machinery

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
	• Heating of bitumen • Crushing and screening of materials	• Air pollution by volatile hydrocarbons aggravated by unfavorable whether conditions (wind, hot, etc) • Local impairment of air quality during crushing and mixing of raw 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	and equipment • Careful timing of works in residential areas)/ restrict construction to certain 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	**Negative:** • Soil and water pollution due to	Temporary/ local	• To plan carefully construction works to minimize

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
	• 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 construction materials • Rehabilitation of road drainage system (drainage channels, chutes, etc.) • Construction materials stockpiling • Construction waste disposals	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 ecosystems due to increased sediment runoff into waterways due to construction/ modification of drainage patterns		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

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
				• Careful selection of sites to be used for construction 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	**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	Temporary/ 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

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
	• Construction materials stockpiling • Construction waste disposals • Establishment of construction camp/ accommodation facilities	**Positive:** • Improved manmade landscape	Permanent/ Local	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 levelling/patching/priming o pavement o crushing and screening of materials o heating of bitumen	**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.)	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

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
	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 • Construction materials stockpiling • Construction waste disposals	• 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 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		and environmental requirements in contract 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 resi-

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

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
		Positive: • Decreased risk of car and local residents accidents due to im-	Permanent/ Local	• Provide advise to the public on shorter alternative routs/bypasses • To ensure proper construction materials stockpiling/ construction waste disposals • Stone crushing plants; asphalt plants should be fitted with approved dust control devices and operate in accordance with environment 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

Environmental and social components	Project activity	Potential Impact	Scale of the impact	Suggested Mitigation Measures
		proved 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		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 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.	Permanent / local	

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	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

Environmental and social components	Project activity	Potential Negative and PositiveImpacts	Scale of the impact	Suggested Mitigation Measures
		• Decreased risk of landslides due to slope stabilization		
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.). **Positive:**	Permanent/ Local 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 • To control properly development and operation of road associated infrastructure along the roads (food and parking facilities, filling stations, recreation stops, etc.)

Environmental and social components	Project activity	Potential Negative and PositiveImpacts	Scale of the impact	Suggested Mitigation Measures
		• 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		
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 combus-	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

Environmental and social components	Project activity	Potential Negative and PositiveImpacts	Scale of the impact	Suggested Mitigation Measures
		tion gases as compared to previous road conditions		• 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 metals)	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 • 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 protec-

Environmental and social components	Project activity	Potential Negative and PositiveImpacts	Scale of the impact	Suggested Mitigation Measures
				tion 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 ani-	**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 settle-	Permanent/ Local	• To provide regular road quality control and maintenance • To provide highway stripping • To provide emergency strips along the road, where appro-

Environmental and social components	Project activity	Potential Negative and PositiveImpacts	Scale of the impact	Suggested Mitigation Measures
	mals Road crossing by cars from country roads Passenger/ goods transportation	ments) • 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		priate • 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

Environmental and social components	Project activity	Potential Negative and PositiveImpacts	Scale of the impact	Suggested Mitigation Measures
			Permanent/	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

Environmental and social components	Project activity	Potential Negative and PositiveImpacts	Scale of the impact	Suggested Mitigation Measures
		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	Local	• Install speed control devices 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 busi-	Permanent/ Local	

Environmental and social components	Project activity	Potential Negative and PositiveImpacts	Scale of the impact	Suggested Mitigation Measures
		ness opportunities associated with road operation (road associated infrastructure - shops, bars, restaurants; selling of home-made 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.		

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 • Construction 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 construction 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 construction materials and wastes disposals • Soil pollution due to improperly arranged accommodation facilities for workers (sewage system, etc.)	Temporary/ 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 construction materials • To ensure proper construction waste disposal sites

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
		Positive: • Decreased risk of soil pollution, soil erosion and landslides resulting from maintenance of drainage system • Decreased risk of land degradation potentials/ gullies formation	Permanent/ Local	• 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 grading • Culvert repair/ replacement ▪ Clearance of drainage channels ▪ Levelling of roadsides	**Negative:** Groundwater pollution due to surface run-off contaminated by petroleum hydrocarbons/ engine oil, lubricants/ compounds of fuel (esp. heavy metals) Groundwater pollution by spills due to vehicles accidents and broken equipment, vehicles and machinery used for road maintenance works	Temporary/ Local	• To plan carefully maintenance works to minimize surface area under the impact from roan maintenance activities • To ensure accuracy of road maintenance works/ machinery and equipment used for repair work • To provide proper stockpil-

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
	▪ Potholes patching ▪ Cracks priming ▪ Winter maintenance (snow removal, dusting by sand-salt mixture) • Operation of machinery and equipment • Traffic of construction vehicles • Construction materials stockpiling • Construction wastes disposals • Short-term accommodation facilities for road workers	(engine oil, lubricants) Groundwater pollution due to improperly arranged construction 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	Permanent/ Local	ing of construction materials • To provide proper construction 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

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
		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		
Air/ Acoustic	• Periodical & Routine maintenance: ▪ Rood repair works • Culvert repair/ replacement/ clearance of drainage channels ▪ Winter maintenance • Traffic of construc-	**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 maintenance works in residential areas over night) • To minimize disturbance/ restrict road maintenance works

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
	tion 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	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	**Negative:** • Disturbance to habitats • Disturbance to wild animals passages, local migration routes and patterns • Death of wild animals due to road accidents	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 appropri-

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
	channels • Care of vegetation along the road ▪ Winter maintenance • Operation of machinery and equipment • Traffic of construction vehicles • Construction materials stockpiling • Construction wastes disposals • Short-term accommodation facilities for road workers	• 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 ecosystems due to increased sediment runoff into waterways due to repair/ replacement of drainage system **Positive:** • Care of green plantations	Permanent/ Local	ate/ no construction during breeding season • Trees, vegetation should be protected during bitumen spraying • Proper arrangement of construction 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 accommodation facilities to minimize environmental pollution • Clean-up the site after work maintenance works are finished

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
		along the roads		
Landscape/ Aesthetic	• Road repair works • Stockpile of construction materials/ construction waste disposals	**Negative:** • Littering of territory adjacent to the road • Damage to landscape due to waste & excavated materials disposals/ stockpiling of construction 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 construction materials/ construction waste disposals • Short-term accommodation facilities	**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/ vibra-	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

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
	for road workers	tions 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		• 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 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 construction 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

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
		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	the area of concern • To ensure proper accommodation facilities for road workers to minimize possible health impact

Environmental and social components	Project activity	Potential Negative and Positive Impacts	Scale of the impact	Suggested Mitigation Measures
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 Annex 1)	Temporary/ Permanent/ Local	

Annex 4 Rivers and Streams in the Project Area

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
Isnovat	55 km – length 2,1 km – 5,6 km – width	The high spring waters usually start at the end of February, beginning of March. The water level during this period grows with 1.0-1.5 m over NCA; the maximum rate was 2.5 m, registered in Sangera town in 1963. The average term of high spring waters is 32 days, the maximum is 53 days (1969, 1974), and the minimum is 16 days (1963). The maximum annual water flow was registered in 1956 of 19.9 m^3/s, the maximum flood level was 17 mm in 1980; the average flood level is 26% from the annual level. The pluvial floods are short and have a high intensity in increase and decrease. Their average time is 7 days, increase time is 2 days, and decrease time is 5 days. The maximum registered level was 6.1m over NCA (1948). The instant maximum flow was 59.6m^3/s in 1961. The average multiannual value of the flow in Sangera town was 0.20m^3/s (6.3 mil.m3) in 1980.	The river head is considered the place where the river bed goes to surface at 2.5 km to North-West of Capriana village, at the altitude of 147m. Isnovat river starts in Bac river, from the right shore, at 54km from this river's bed, at the altitude of 119m; the average gradient is 2.16%0. The valley is in the shape of V. The versants are 70-90 m high, and are abrupt or very abrupt, predominantly concave, from sandy clay. From Ialoveni town until Braila village they are almost vertical, showing the bed rocks. From Bacioi village until Sangera town the left versant is moderately abrupt and furrowed. There are vineyards and gardens on the versants. On the river two barrier lakes were formed with a total volume of 21.8 mil.m3 of water and a total surface of 535 ha. The water of the barrier lakes is used for irrigation, fish farming, technical water and recreation. 0^0 C in winter, 20-22^{0}C in summer, maximum registered temperature	The basin is situated in the Center-East part of the Codri Plateau. The watershed line is at 300-325 m height, towards the river bed it goes down to 100-130 m. The relief is hilly, the hills, the valleys and the ravines erode deeply the basin surface. The versants are abrupt and very abrupt, planted with vineyards, partially furrowed, in the upper part of the basin they are wooded (23% from the total surface). The surface of the basin is 354km^2. The basin is made up of sedimentary rocks (limestone, clay and sands) on which were formed gray forest soil and black soil.	Black soil (chernozem) Gray forest soil

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
			was in 1958 – 31.3 ^{0}C. In November-December ice starts to appear on the shore. The ice bridge is formed by growing from the shore ice and is very unstable. It usually lasts 60 days, maximum is 123 days (winter in 1953-1954), and minimum is 16 days (winter in 1974-1975). The ice thickness at the end of the winter is 30-35 cm; maximum is 73 cm (1966). The ice melt		
Botna	The length of the river is 152 km The width varies from 0.5 km (headwaters) until 4.2 km (at 1km from Salcura Noua village, the lower part of the stream), the predominant width is 1.5-3.0km. The width of the river is 2-8m, depth	The high spring waters start usually at the end of February, beginning of March. The maximum level rises until 1.5-2.0m height over NCA. The maximum value of this level was 3.1 m in 1969. The average time of high spring waters is 39 days, the maximum time is 70 days (1953), and the minimum is 20 days (1978). The maximum flow of high spring waters was registered in 1955 – 69.9m^3/s. The total flow in this period was 30% from the annual rate. The pluvial floods that are usually during summer-autumn are short term, on average 10 days. The maximum level was registered in 1972 – 4.24 m over NCA. From the maxim flows, the extreme is 104m^3/s, registered in	The river Botna starts at the headwaters situated at 1.7 km towards the South of Stejareni village, at the altitude of 225 m, and starts in Nistru river on the right shore, at 201 km from the creek, at the altitude of 5m. The fall is 22o m, the average gradient is 1.45%0, and the maximum is 8.2% 0 in the first 9km. The valley of the river is not very flexuous, in the upper stream until Zambreni village is in V shape. The versants reach 80-140 m, in some places 180-~E210m, mainly abrupt, mostly concave, disjointed, from sandy clay and sand, opened, agricultural, planted with vineyards	The surface of the basin is 1540 km^2. The basin is situated in the South-East of Codri Plateau in the South of Lower Bac valley. The surface of the basin is hilly, strongly fragmented. The absolute altitude of the surface varies from 270-250m in the upper part until 150-130m in the lower part of the basin. The watershed is expressed well; the altitude reaches 230-379.6m. At the basin base are tertiary rocks from limestone, and sand with a	There is gray forest soil in the upper part of the basin, and black soil in the lower part of the basin

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
	0.1-0.8m, the water stream speed varies from 0.11a 0.5m/s.	1955, and the average one 16.4m^3/s, the flood flow level is 2.1 mm. The minimal daily flows vary between 0.14m^3/s, 0.64m 3/s (1980), and the draught of the river. The average flow of alluvia during the observed period is 0.37 kg/s. The maximum flow is 1.7 kg/s (1979); minimum is 0.007 kg/s (1993). The average annual turbidity of the water has a value of 360g/m3.	and gardens near localities. The left versant near Horodca village and the right versant until Costesti village are forested (oak, ash, teil, beech). In the lower part of the stream near Rusestii Noi village there are terraces with low gradient and height of 2-5m. The section between Ulmu and Gangura villages has land sliding. The bilateral valley, with the variable width from 50 m to the headwaters until 1.6m (Carnareni village), the predominant width is 0.5-1.2 km. The surface is flat, dry, on the section near the bed of the river is wetland with oaks, in some places willow bushes, until Zambreni village furrowed. The meadow is formed from sandy clay, during high waters it is covered with a water layer with a thickness of 0.3-1.0m. The river bed is flexuous, not branched, regulated, in many places dry. Near Chircaiesti village the river flows through a degraded lake (Botna lake), in summer is dry, with a length of 4.5 m and the width is 1.7 km.	quaternary cover: in Codri are not stratified alluvium gravel, and the rest of the territory clay, loess. The most of the basin is agricultural, and only 6% from the surface are forests (oaks, ash, teil, beech). There are very few marshes, only 0.8% from the surface. In the basin are on average 420-460 mm rainfall, especially during the warm season of the year (approximately 70-75%). The average water reserves from the snow are 22 mm, and the snow cover layer reaches up to 45cm thickness. The hydrographic network is very well developed (0.55km/km^2). Through the basin flow 273 rivers with a total length of 841 km, but the rivers with the length less than 10km are predominant (263 rivers), 7 rivers	

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
				have 10-20 km length, 1 river – 23 km, and the main river Botna – 152 km. The main affluent is Botniciara, Valea Tighina valley, Cainar and Larga.	
Cogalnic	The length of the river is 221 km,	The river system is characterized by high spring waters, short pluvial summer floods, on some sections complete draught. In spring the level increase start at the end of February, reaching 0.5-1.5m in normal years and 1.5-2.5m in rainy years (1947, 1960, 1969, and 1977). The phenomenon lasts 20-25 days, and then the river is dried on many sections. In some years the high spring waters do not appear, and the draught in the lower stream lasts until autumn. The maximum level of spring waters (13.7 m3/s) was recorded in 1980. The pluvial floods, with an increase intensity of up to 1m/day, are recorded in April-November, in some years they are missing almost everywhere, the draught lasts more than 200-250 days per year. The increase of the floods reaches 0.5-1.5 m, rarely 2.5m. During one	The river Cogalnic starts at 3 km North-West of Ciuciuleni village, and starts with two branches (the left is the richest with water) in the North side of Sasak lake, 5km South-East of Tatarbunar village, Odessa region, Ukraine. The fall of the river is 237m, the average gradient is 1.1 %, and the meander coefficient is 1. 43. The main affluent is: on the left river Galbena (with the length of 25km), river Cosim (34km), river Ceaga (116km), river Djalar (26km), river Cilighider (60km). From the structure of the river bed, there are two sections of the water stream. 1st Section: from the watershed to the Schinoasa village. 2nd Section: from the creek of Schinoasa river to the flow. The river valley is not very flexuous,	The surface of the basin is 3910km^2. The basin is elongated from North-West to South-East, asymmetrical, more developed on the left shore. The upper part is on the Codri Plateau, the central on Southern Moldova Plateau and is characterized by a hilly relief. The length of the basin is 182km. the average width is 21 km, the width coefficient is 0.1 The basin is well defined: the length of the watershed is 421km, the development coefficient is 1. The upper part of the basin is in Codri Plateau with the altitude of watershed 260-390, that are gradually decreasing	The soil is chernozem

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
		summer through the river pass 2-7 floods. The maximum flood was recorded in Hancesti town and was 21.7 m3/s (in 1960). The ice bridge is formed at the end of December and in some years the year is frozen for a period of 50 days. In spring the river is melting the ice instantly, very rarely are observed ice layers for 1-3 days. The average annual water flow on the observation period was 0.29 m3/s, the volume of overflow – 6.72 mil.m^3. The maximum annual flow (0.83 m3/s) was observed in 1981, minimum (0.10 m3/s) in 1990. The average multiannual value of the flow of minimum 30 days during the open river bed was 0.05 m^3/s. The maximum of this value was recorded in 1980 – 0.20m3/s, the minimum was registered in 1964, 1992 (0.001m^3/s). The level of pollution of the river is high in nitrogen of ammonium, phenol, copper components, oil products, powders.	trapezoidal. The length of the section is 120km. The predominant width is 3.0-3.5 km, the maximum is 5.5 km (at 1.5km near Novoalexeevka village and in Tatarbunar town), and on the section of the creek it is joining with the Sarata river. The right versants concave, crossed by short ravines (until 1.5km length), but deep with abrupt versants; towards the creek the altitude is decreasing from 100-150m until 30-60m. The left versant is slightly abrupt and slightly crossed by valleys and ravines, with a height of 30-70m. Between Novosiolovka village and Tatarbunar town, on the right versant and in Danilovka village region, and in Artiz town, on the left versant the terraces are well defined with a width of 0.1-2.0 km with a very flat rift – 1.5-4.0m height. Here it's observed the second terrace with a flat step and a height of 8-14 m, with a flat surface. The versants are mostly furrowed. The meadow is bilateral, partially it alternates from one shore to another, with a width from 0.2 km (at 2km near Novosiolovka village) up to 3.3 km (Tatarbunar village), predominantly 1-2km. The surface is	on the plain, towards the creek until 70-80m. About 60-65% from the basin surface it's shown, 1.6% is occupied by forests, placed especially in the upper side of the basin, until Hancesti town. The lakes have only 0.1% of the area. The basin is formed from magma and tertiary limestone, sands covered with quaternary loess layer, sandy clay and clay.	

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
			flat, with plain vegetation, crossed by small depressions (0.5-1.5m depth). In the upper part of Tatarbunar town, on a length of 1.5 km it is wetland, near localities it is furrowed. It is formed from sandy clay with sandy clay shores, in the section near the creek are alkali soil. The bed river is meandering, ramified, with grass, partially with bulrush and cane, in summer it is drying until Tatarbunar town. The width in the upper part is 10-15m; it reaches up to 60m. In the lower part of the stream of Tatarbunar town, the river has a permanent water flow, with the width of 14-70m, depth 0.1-0.5m. The bed of the river is flat, with clay and shores. The shores are abrupt with the height of 1-2m, in the creek area they join the meadow and are with grass. The hydrologic system of the river was studied, except for the war period, in Gura Galbena village (1940-1956), Novosiolovka village (1940-1953) and from 1945 until 1956 in Basarabeasca town, and Hancesti town (1957-2002). The observation documents, in the form of multiannual data and calculation characteristics of the main		

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
			system elements are published in CSA documents.		
Ialpug	The length of the river is 114 km,	The high spring waters occur during the last days of February-beginning of March. The average increase of water level in the upper part of the river (up to Ialpugel river delta) constitutes 0.7-2,0 m above NCA. The top increase of the water level was recorded in 1947 and constituted 2,2 m above NCA -in Comrat town, 3,3 m above NCA - in Congaz village, 1,5 m above NCA - in Bolgrad town. The increase lasts 2-10 days, the decrease lasts 7 -13 days. During years of small reserves of snow water, the increase during spring time does not exceed 10-30 cm. During summer time the river is subject to pluvial rapid waters 2-5 times, which causes an increase of the water level up to 0,5-2,5 m. During drought years the river is getting dry in many places, sometimes over a period up to 186 days. The winter levels are characterized by small amplitudes (0.2-0,3 m), being caused by frequent damp weather. During cold winters the river is getting frozen for a period	The river Ialpug starts at the West North suburb of Marienfeld village and starts in Ialpug lake, near Bolgrad town, Odessa region, Ukraine. The main affluent is: on the right side a river without name (length is 12 km), Mussa river (16 km), Chirsova Mare river (27km), Cerac (10km), Ialpugel river (45km), Odaia creek (26km), Salcia Mare river (45km), a river without name (10km); on the left side is Lunga river (78km), Sarmalia river (24 km). The valley is flat, until Congaz village it is V shape, with the width of 2.5-4.0 km, the rest is square shape (5.0-7.0km). The versants are concave and convex, disjointed, slightly abrupt, with the height 80-100 m, the right versant on the section Alexeevka village-Chirilovka village reaches the altitude of 130-140m, near Svetlii village – 179m, the left versant near the lower part of Aluatu village goes down to 34 m. The versants are formed from sandy clay and clay. Along the Chirsova village it has a length of 3.5 km, there is a high terrace (15-18 m) with a width	The surface of the basin is 3180km^2, the river fall is 128 m, the average gradient is 1.1%, and the meandering coefficient is 1.11. The basin is situated in Ialpug depression, elongated from North to South, wider in the central part. The length of the watershed is 290km, the development coefficient is 1.45; the length of the basin 112 km, the average width is 28km, the width coefficient is 0.25. The basin has a disjointed plane relief. The East versants of the valleys and ravines are abrupt and very abrupt, strongly disjointed, the West versants are flat or moderately abrupt. The watershed is relatively flat. The absolute quota near Comrat town	Typical chernozem is predominant

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
		between 6 and 30 days (years 1946-1947, 1949-1950, 1961-1962). It is getting frozen more frequently in December (early frosts occur at the end of November, the latest frost –at the beginning of February). The ice bridge is anticipated by ice appearing at the bank, sometimes with a torrent or a flow of ice pieces (years 1946, 1947), being unstable, during damp weather the river is getting free of ice for 10-15 days (sometimes for 30 days). The ice is smooth, 10-20 cm thick. The phenomenon with the ice maintains during roughly 70- 75 days, during cold winter times – for 130-140 days (winter of 1953-1954), during mild winter times – for 40-45 days (winter of 1947-1948). The river is getting free of ice during the second half of February-beginning of March, the ice melting immediately on the spot not flowing, but during some years there could be noticed a flow of ice pieces (1945-1947).	of 700-800 m, with a very abrupt step, exposed, of a height of 10-12 m, slightly inclined towards the river, ploughed. At the slope foot, near villages Cenac and Chirsova, there can be noticed phreatic waters appearing on the surface with a debit of 1 Vs. The flood-land (water-meadow) is bilateral, 2,5 km downwards Ialrugeni village there is a 2 km sector, which is interrupted. The width upwards Bugeac village is of 150-350 m, downwards -500-600 m, towards the river delta it becomes wider up to 1 200-1 400 m, the maximum one -1 900 (the confluence with Salcia Mare river). The surface is flat (smooth), open, dry, with some steps, the place near Chirilovca village and opposite the Salcia Mare river delta is partially wetland, being seldom ploughed. The river bed downwards Chirsova village is slightly winding, of 2-8 m wide. The average width of the river is 1,0-6,0 m, the depth -0,3-1,0 m, the velocity of the water flow- 0,1-0,3 m/s. Downwards Chirsova village, the bed goes through a canal, of 6-10 m wide, unstable. The banks are abrupt, of 0.5-1.6 high, consist-	reaches 220-300, in the lower part of the stream the decrease gradually until 120-150m, the average height of the basin is 130m. The biggest part of the basin surface (70%) is occupied by arable lands; the forest (oak, acacia) occupies only 7% of the basin surface. The basin is formed from limestone (high depths) and sandy clay rocks. In the Ialpug river basin there are 19 accumulating lakes of a total water–table surface area of 3 192 ha and a volume of 92.9 mil. m3. There are approximately 140 of small water accumulations. The accumulated water in lakes is used for irrigation, fish farming, for technical and recreation purposes.	

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
			ing of loamy sand, rarely of clay. The river conditions are reflected by the observation data in hydrometric points, which were operational in Bugeac village and Comrat town during 1944-1948, 1962, 1963, 1965, and 1966, 1969-1980. The observation data were published in the respective CSA editions.		
IALPUGEL	The length of the river is 45 km		The source of the river is situated 4 km to the North of Borogani village. It falls into Ialpug river from the RHS bank 43 km from its delta, 1,5 km to the North-West of Alexeevca village. The slope of the river is 1.7%0. The main affluent are: Samalia river (RHS affluent, 14 km from the river delta, the length is 24 km); Odaia river (RHS affluent, 8 km from its delta, the length of 26 km), a nameless river (RHS affluent, 3 km from the delta, the length of 10 km). There are some 19 affluent more that are falling into the river, them having a length less than 10 km and of a total length of 72 km. The relief is slightly dismembered, consisting of sandy –clay and loamy-sand, with black earth (chernozem). The most part of the sur-	The collecting basin is relatively narrow, elongated from the North to the South. The average height of the basin is 130 m, the surface area -507 km2, the average slope -69%0, the length-50 km, the average width -10 km, the density of hydrographic network -0,44, coefficient of meandering -1,05.	Black earth (chernozem).

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
			face is under field crops, and only small sectors are planted with vineyards and fruit gardens. The valley is almost flat, being of a V -shape, 2-4 km wide. The slopes have an altitude of 50-100 m, predominantly concave. The RHS slope is slightly abrupt, dismembered. The LHS slope is smooth and slightly abrupt, slightly dismembered, the most part of it being ploughed. The flood-land (water-meadow) is bilateral, 150-250 m wide; near Chioselia Rusa village it is getting wider up to 730 m, near Borogani village it is getting narrow – up to 60 m. The surface is flat (smooth), mainly ploughed. The river bed is winding, not ramified, downwards Taraclia village goes through a channel and a dike. The upper part of the river is seldom getting dry during summer time. The width of the river bed is 1,2-2,5 m, of the channel -6-8 m, the depth of the bed -0,2-1,0 m, of the channel -1,5-2,0 m. The lake waters are used for irrigation and for cattle watering.		
SALCEA MARE	The river length is 45	The increase of spring waters usually starts in the first decade of	The river origins 4,5 km to the North	The basin has an irregular shape, being elon-	The predominant soil is the

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
	km	February. It develops intensively, reaching 2-3 m above NCA. The decrease lasts 8-12 days. The average length of high spring waters is 30 days, the top one -48 days (1948), the minimum one- 9 days (1933). Among the maximum levels, the top value, registered in Musaitu village in 1980, was of 4,8 m3/s, and the lowest one -0,68 m3/s in 1983. The rapid pluvial waters are characterized by rapid increases and decreases. The increase reaches 3 m above NCA. The top debit of rapid pluvial waters of 27.7 m3/s was recorded in 1985. In winter, due to frequent damp climate and to simultaneous precipitation, the level is unstable. The increases of level are small – less than 0,5 m above NCA. The river is getting frozen in the first decade of December. The ice bridge, anticipated by appearance of ice at the bank, is unstable, the average length of it being of 37 days, the maximum length -90 days (1992-1993), the minimum length –total ice missing (1976-1977). The river is getting free of ice in the second half of February. The average	of Huluboaia village and falls into lalpug river from the RHS bank, 13 km from the delta, 0,5 km to the South-East of Ciumai village. The main affluent are: Salcia Mica river (from the LHS bank, 16 km from delta, having a length of 37 km), Salcia river (from the LHS bank, 4 km from the delta, having a length of 29 km). The river receives 41 affluent more each having a length less than 10 km with the total length of 156 km. The slope -3.8%0, coefficient of meandering -1,12. The surface area of the collecting basin is of 590 km2, the average height is 150 m, the average slope -73%0, The length- 46 km, the average width -13 km, the density of the hydrographic networks -0,45 km/km2, coefficient of asymmetry -1,03, coefficient of development of the watershed -1,48. The covered surface area by accumulating lakes is less than 1 %, by arable lands -70%, by forest -16%. The valley is of V-shape, getting gradually wider from 1,5 km at the source place to 4,5 km at the delta. The slopes have a height of 50-150 m, being concave, abrupt, up to	gated from the North to South-East, wider in the central part, asymmetric, more developed on the LHS. The upper part is situated – on Tigheci Hills, having many small valleys and ravines. The surface is cultivated, being planted with vineyards and gardens. It consists of sedimentary rock of Neocene period. In the river basin there is an accumulating lake of a volume of 1.3 mil. m3. The river water is used for irrigation, fish farming, and recreation.	black earth (chernozem).

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
		multiannual value of the water flow in Musaitu village is of 0.36 m3/s or 11.4 mil. m3. The annual flow vary from 0,032 m3/s (1.01 mil. m3) in 1994 to 0.68 m3/s (21,4 mil. m3) in 1981. The minimum debit values of 30 days during the period when the river bed is open are as follows: the average one -0.11 m3/s, the maximum one - 0,32 m3/s (in 1989), the minimum one –when the flow is missing (1978). The minimum level during 24 hours is roughly equal to 0.068 m3/s, the maximum one is equal to 0.21 m3/s (in 1989). In 1978 there was not recorded any flow as such. The average annual debit during the period of 30 days of observations over the alluviums of the suspension was of 0,15 kg/s, the maximum one -0,44 kg/s (in 1987), the minimum one -0,001 kg/s (in 1995). The water turbidity ranges between 25 and 1300 g/m3. The instant maximum water turbidity reaches 19000 g/m3.	Moscovei village it is slightly dismembered, more dismembered downwards: the RHS slope is very abrupt and subject to land sliding. The flood-land (water-meadow) is bilateral, of 30 m wide (at the source place) up to 600 m wide (at the confluence with Salcia river), the predominant width being 100-200 m. The most part of it is ploughed, closer to localities there are thickets of willow species. The flood-land consists of sandy clay, 2 km to the North of Trifesti –of loamy sand. The river bed goes through a canal and a dike and has a width of 6-12 m. The depth heights do not exceed 0.3 m, the velocity is slow (0,1-0,2 m/s). The river bed is smooth, sandy and silty. The bank slopes are abrupt, having a height of 1,5-2,5 m, near Hu1uboaia village reaching 3,0-3,3 m. Closer to localities there are many thickets of bush woods. The river condition has been studying in Musaitu village since January 1977 till nowadays. The observation data are published in the respective CSA papers.		

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
CAHUL	The length of the village is 39 km,	The high spring waters do not occur every year due to small quantity of snow water. They start at the end of February- the beginning of March and the increase usually reaches a level of 0,5-0,8 m above NCA during ordinary years and a level of 1,3-1,6 m – during years with much water (1947,1954,1956,1958,1961,1963). The increases last 2-10 days, the decrease last 5-13 days. During the years 1946, 1948,1949,1959,1960 there were not recorded high sprig waters. In May-September the river is subject to rapid pluvial waters (2-5 times) of a height of 0.6-1,5 m; the maximum increase levels (1,2-1,9 m) and the maximum debit (310 m3/s against the debit of Prut river) were recorded in June 1966. Approximately the same levels were recorded in 1948, 1955 and 1968. Between the periods of rapid waters the river is getting dry for a period of 2 days (1967) to 184 days (1951). In winter the level variations are small and are due to damp weather.	Cahul river descends from the confluence of two rivulets at the Northern suburb of Pelinei village. It falls into Cahul lake at the Southern suburb of Etulia village. The drop is 62 m, the average slope -1,6%0, coefficient of meandering -1,03. The main affluent of the river: on the LHS are: - Gavanoasa rivulet (13 km long); on the RHS – a nameless river (22 km long). The collecting basin is situated in Cahul Plain. The basin is asymmetric, more developed in the central part and on the RHS bank, relatively narrow (5 km) in its lower part, slightly elongated from North-West to the South. The length of the crest line (watershed) is -130 m, coefficient of development -1,79; the basin length -62 km, the average width -9,8 km, coefficient of width -0,16. The basin relief is wavy, with many ravines and small valleys. The watersheds (crest lines) are well-expressed. The valley is of V-shape, 1,5-4,5 km wide. The slopes have a height of 60-120 m, are dismembered, slightly abrupt and abrupt, ploughed,	The surface area of the collecting basin is -605 km2. The absolute levels of the surface from the very source to its delta gradually drop from 180-220 m down to 100-120 m, the average height of the basin is 120 m, the average slope -66%0. The basin foundation consists of limestone and clay, covered with black earth (chernozem). The most surface of the basin is ploughed (80%), the abrupt slopes are covered with vegetation characteristic for steppe, and the forests (oak, maple, acacia) cover 3% of the total surface area. In the river basin there are two accumulating lakes (of a total surface area of l28 ha and a total volume of 3,02 mil. m3) and 12 small water accumulations (small lakes). The waters accumulated in the lakes	Black earth (chernozem).

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
		In winter the level variations are small and are due to damp weather. The river is getting frozen in December. There were recorded cases when the river got frozen completely up to the bottom for a period of 6 days (1961) to 63 days (1947). During some years the river remained dry during summer or autumn till February-March (1953-1954). The ice cover is unstable, the river melting for a period of 7-12 days during damp weather. At the end of February- the beginning of March the river is completely getting free of ice, the ice melting mostly on the spot. During some years (1947, 1953), in the lower part of the river one could notice the flow of ice pieces during a short period of time (2-3 days). The average length of such phenomenon with ice is of 70 days, the maximum length- 142 days (1953-1954), and the minimum length -47 days (1960-1961).	planted with vineyards and gardens. At the Southern suburb of Vulcanesti town the RHS slope is very abrupt, and downwards A1exandru loan Cuza village the LHS slope is very abrupt. The both slopes are covered with vegetation characteristic for steppe. The flood-land (water-meadow) is bilateral, narrow up to Vulcanesti town (100-200 m), near the town it becomes larger up to 700 m, and downwards it becomes again narrow up to 300-500 m. The surface is flat, consisting of loamy sand, with forage pasturable vegetation, ploughed, between Greceni village and Vulcanesti town – with thickets of willow bushes. The river bed is slightly winding, not ramified, dry in many places; 2 km downwards Greceni village and 2 km from the river delta it is slightly ramified. Between Vulcanesti town and A1exandru loan Cuza village the river bed goes through a channel of -6-8 m wide; of 2-3 m deep with dikes of 1,0-1,5 m high. The river width upwards Vulcanesti town is 6-10 m, the widest place being near Gavanoasa village-12 m. The river bed foundation is smooth, sandy, sometimes silty, downwards	are used for irrigation, fish farming and swimming.	

Name of the River	Length, width of the river	Flow rate	Description	Basin of the River	Soil description
			Greceni village – on a length of 2 km –with rush. The bank slopes are abrupt, being of 0,5-1,3 m high, their edges being weedy, partially with thickets of willow bushes, and consisting of loamy sand, which can be easily washed out. The river conditions had been under a study since 1945 to 1968 at the hydrometric point of Gavanoasa village. The observation data and the characteristic calculations are published in the respective CSA editions.		