Municipal Development Fund of Georgia

Addendum to Initial Environmental Examination

Section-3: Phonichala – Rustavi (IEE 2)

Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azerbaijani Border) Road

(Section 3 Local Roads)

Contract No: SUTIP2-ICB-1.03

Funded by

Asian Development Bank

Loan: 2655-GEO

Prepared by: Joint Venture of Dohwa engineering co. Ltd / RRMSD Ltd

Prepared for: Municipal development Fund of Georgia

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ABBREVIATIONS

ADB	Asian Development Bank
EIA	Environmental Impact Assessment
EIP	Environmental Impact Permits
EMP	Environmental Management Plan
HWL	High Water Level
IFI	International Financial Institution
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
L/A	Loan Agreement
MAC	Maximum Admissible Concentration
MoE	Ministry of Environment Protection and Natural Resources
NSFSVPP	National Service for Food Safety, Veterinarian and Plant Protection
ODA	Official Development Assistance
PAP	Project Affected Persons
RAP	Resettlement Action Plan
RD	Roads Department
RDMRDI	Roads Department of Ministry of Regional Development & Infrastructure of Georgia
RoW	Right of Way
RPF	Resettlement Policy Framework
TEM	Trans-European Motorway
TOR	Terms Of Reference
USSR	Union of Soviet Socialist Republics
WB	World Bank

WEIGHTS AND MEASURES

°C	degree Celsius
ha	hectare
km	kilometre
km^2	square kilometres
litres/s	litres per second
m	metre
m^2	square metre
m^3/s	cubic metre per second

m^3	cubic metre
mm	milimetre
s	seconds

CURRENCY EQUIVALENTS

Currency Unit - Lari (GEL)
$1 = approx1.75 (September 2014)

EXECUTIVE SUMMARY

Background

Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azerbaijani Border) Road Project (Section 3) requested preparation of an addendum of IEE document for Local Roads. Preparation of this document was initiated by The Municipal Development Fund of Georgia (MDF) (executive agency) after reviewing the Detailed Design prepared for Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azerbaijani Border) Road Project (Section 3) and identifying the necessity of Secondary (Local) Road existence at the right side of Section 3. MDF is the project executing, implementing and disbursing agency. The project will focus on the constructing of the new local road.

The national consultant WEG has been engaged by DOHWA Engineering co., to prepare and deliver the IEE for Phonichala-Rustavi Local Road Project to MDF.

Scope of Report

The IEE demonstrates and describes the need for this Project. The IEE details the Project concept design, proposed method of delivery and proposed location of the Project. This IEE considers the technical constraints of the Project and by doing so presents the potential positive and negative social and environmental impacts that may result from its implementation.

This IEE presents the following:

- Introduction and assessment methodology;
- Project Description
- Legal requirements;
- Description of existing environment:
- Socio-economic condition
- Considered Project alternatives;
- An assessment of potential impacts as a result of the Project:
- Proposed mitigation and environmental management plan;
- Environmental Monitoring Program
- Public consultation;

- Grievance Redress Mechanism
- Conclusions and recommendations

Objectives

This Initial Environmental Examination (IEE) has been prepared as part of the ADB supports (ADB Loan 2655-GEO) in undertaking the feasibility/design of the Engineering, Procurement, Construction Management and Supervision of the Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azerbaijani Border) Road Project (Section 3) and identifying the necessity of Secondary (Local) Road existence at the right side of Section 3.

The objective of the study is to help the Government prepare and implement an efficient, safe and sustainable transport network, in accordance with international environmental safeguards.

Project Description

This IEE Report is prepared for Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azerbaijani Border) Road Project (Section 3) and identifying the necessity of Secondary (Local) Road existence at the right side of Section 3, has 6.6km long length of road alignment is entirety located in Gardabani district, Alignment of project road mainly coincides with the alignment of the existing road Tbilisi-Red Bridge.

The project is focused to improve the current conditions of local inhabitants in regard of transportation. The project of Secondary roads (Local Road) is aimed to the improvement of local roads and will ensure safe and reliable access of locals to the main road linking Tbilisi and Rustavi.

Government Policies and Legislation, ADB SPS

Present document presents detail description of the environmental legal framework and administrative structure in Georgia including environmental regulations, measures required and indicates the institutions at the local and national levels responsible for issuing permits, licenses, and enforcing compliance with environmental standards. ADB safeguard requirements; screening and categorization of projects. This Section also provides public consultation procedures; procedure for official submission of EIA/IEE, Rules for construction projects by Government Ministries etc. In addition, information on relevant agencies such as, Road Department, Ministry of Environmental protection, and Ministry of Economy and Sustainable Development are assembled as well.

Summary of Findings

This IEE study has identified that there is the potential for both positive and negative environmental and social impacts to occur as a result of the Project. The IEE has determined that comprehensive and effective management and mitigation measures are feasible to be implemented through all delivery phases of the Project. Such measures could feasibly mitigate potentially negative impacts and enhance the identified potential positive benefits. Key potential negative impacts identified in this IEE if unmitigated include:

- Impacts to environments are possible from the accidental spillage, leakage or improper management of hazardous substances such as fuels or oils;

- Wastes generated by the accommodation of personnel living and working on site could pollute nearby environments if improperly managed;
- Noise from project construction activities may affect local people or nearby fauna;
- Air pollution: Air pollution can appear during earthworks, gravel crashing, and transportation in case of improper maintenance and operation of equipment, inadequate storage of fine-grained materials, and movement of vehicles on unpaved or dusty surfaces
- Ecological impact is mainly related with the need of cutting trees along the road widening zone (mostly artificial greenery plantations are to be felled, although some smaller patches of natural vegetation and some individuals of red data species could be affected), according to the field survey there are Georgian Red List 11 units of *Ulmus minor Mill* were determined.
- The identified potential negative impacts are likely to be able to be minimized and managed effectively with the implementation of the measures detailed in the Environmental Management Plan.

The community consultation field work resulted in engagement with a large number of stakeholders, across a broad range of socio-economic groups. The main results of this consultation showed that the community is supportive of the proposed Project and perceived benefits of the Project by increasing business and local employment opportunities.

The detailed Resettlement Action Plan is under preparation.

Results of this IEE suggest that the proposed Project is likely to be able to proceed without resulting in any negative significant impacts to physical, biological, or socio-economic environments occurring, if appropriate management measures are implemented. As such, the Project will have overall beneficial impact as well as some minor negative impacts that will be carefully monitored and adequately mitigated. Therefore, the completion of this IEE fully meets the MoE and ADB requirements and submitted to MoE to obtain Environmental Impact Permit.

Conclusion / Recommendation

It is recommended construction of the new local road deemed necessary to avoid direct potential impacts to the bio-physical environment, archeological/historical, natural, and cultural resources occurring along the immediate vicinities of the road. The recommendations generated during the public consultations undertaken for construction of Tbilisi-Rustavi Local Road Section 3 were considered and incorporated.

It has been assessed that most of the potential impacts of the Local Road Section 3 will be during the Construction Stage; these will be temporary and can be managed effectively with the updated mitigation measures.

The SEMP and monitoring program will be implemented by the Contractor during the construction period. Moreover, appropriate clauses will be included in civil works contracts to ensure the implementation of the SEMP.

1. INTRODUCTION

1.1 Background

This document is an addendum to IEE prepared under Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azerbaijani Border) Road Project (Section 3).

This project is one of the Component parts of Sustainable Urban Transport Investment Program-1 (SUTIP-2) financed by Asian Development Bank's Loan and executed by Municipal Development Fund of Georgia (MDFG).

Preparation of this document was initiated by MDF (executive agency) after reviewing the Detailed Design prepared for Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azerbaijani Border) Road Project (Section 3) and identifying the necessity of Secondary (Local) Road existence at the right side of Section 3.

1.2 Objectives

This addendum to Initial Environmental Examination -2 (IEE-2) has been prepared for Local Roads of Section-3, as part of the ADB supports in undertaking the Detailed design of the Engineering, Procurement, Construction Management and Supervision of the Tbilisi-Rustavi Urban link (Section 3) of 6.6 km. The objective of the study is to help the Government prepare and implement an efficient, safe and sustainable transport network, in accordance with international environmental safeguards.

The objective of Secondary road construction is to provide convenience to the residents who are living in the area and to sustain current passing system by constructing the secondary roads in the sections where the existing secondary road is disconnected from Tbilisi-Rustavi highway.

In addition, the IEE aims to identify the likely impacts, both positive and negative, and assess the impacts on the environment of the proposed intervention undertaken by the MDF. The basic objective is to ensure that nobody is made worse off as a result of such development. The overall aim is to ensure that the proposed project is environmentally sound and sustainable following the international requirements laid out in United Nations Framework Convention on Climate Change to which Georgia is a signatory (Ref: Short List of the Ratified Conventions in Section 1.2.4 of Volume-II).

1.3 Methodology for IEE

This IEE follows the methodology outlined in the ADB Guidelines; ADB Safeguard Policy Statement, June 2009 (SPS 2009) and environmental Laws of the Government of Georgia. The experiences of other studies in preparing IEE documentation for transport sector have also been reviewed. This IEE is prepared based on review of detailed design, collection of primary, secondary data and information, field visit, discussions with the MDF and Environment Department, and stakeholder consultations.

This report covers the description of existing environmental conditions, assessment of environmental impacts of proposed road project, recommended management and mitigation measures and monitoring of selected parameters. The environmental impact was considered for activities during pre-construction, construction and operation phases of the Project. The scope of the IEE covers the natural and human environment, their interaction and any induced change brought about by the road construction/reconstruction activities.

Further, various environmental activities were carried out at the project feasibility and planning stages. Sector experts conducted both office studies and field investigations and on-site assessment of the environmental condition. A full set of the required environmental and social information has been collected. The National Environmental Agency took samples of surface water, soil and ambient air and analyzed them. The design team checked the background noise and radiation along the entire alignment for the proposed route. Emission impacts of the traffic were analyzed using licensed software “Ecolog– Magistral”. Noise and vibration modeling was executed by DOHWA engineering team.

Sensitive environmental and social receptors were analyzed in the project area and the results of the analysis were considered in design and planning of mitigation measures. The land acquisition and resettlement issues are submitted as a separate document – Resettlement Action Plan. Mitigation measures were integrated within the Environmental Management and Monitoring Plan

The IEE document is structured as main text and annexes. The main body of the text provides concise and logical description of the environmental condition, sensitive receptors, potential environmental impacts and relevant mitigation measures, integrated in the Environmental Management Plan (EMP). The annexes provide more detailed information regarding particular issues, like: the report of the he National Environmental Agency on the environmental pollution (water, soil and ambient air), the results of traffic pollution modeling.

However, the data from the following disciplines were also reviewed and incorporated in to the IEE study.

- Engineering
- Hydrology
- Ground water
- Public Health
- Land Acquisition and Resettlement

Thanks should be acknowledged to the MDF, concerned agencies, field level personnel, and local people who assisted in the studies.

2. DESCRIPTION OF THE PROJECT

2.1 Overview

The project is focused to improve the current conditions of local inhabitants in regard of transportation. The project of Secondary roads (Local Road) is aimed to the improvement of local roads and will ensure safe and reliable access of locals to the main road linking Tbilisi and Rustavi.

2.2 Type of the Local road (Secondary road)

Under this project the existing unpaved Local road with width of 2~3 meters an asphalt paved local road with width of approximately 7meters.

2.3 Need for the Project

As previously mentioned, need of the local road construction aroused as per ADB safeguard policy which is to ensure that nobody is made worse off as a result of such development. Namely, local residents shall conveniently and safely access the bus stop pavilions located on Tbilisi-Rustavi highway as well as the highway itself which will take local residents to Tbilisi and/or Rustavi.

2.4 Location

Local Road (secondary road) is to be constructed along the Section 3 of Tbilisi-Rustavi highway starting from PK105+00 of the main road and completing at PK 162+50.6

(**please see map below for detailed locations**)

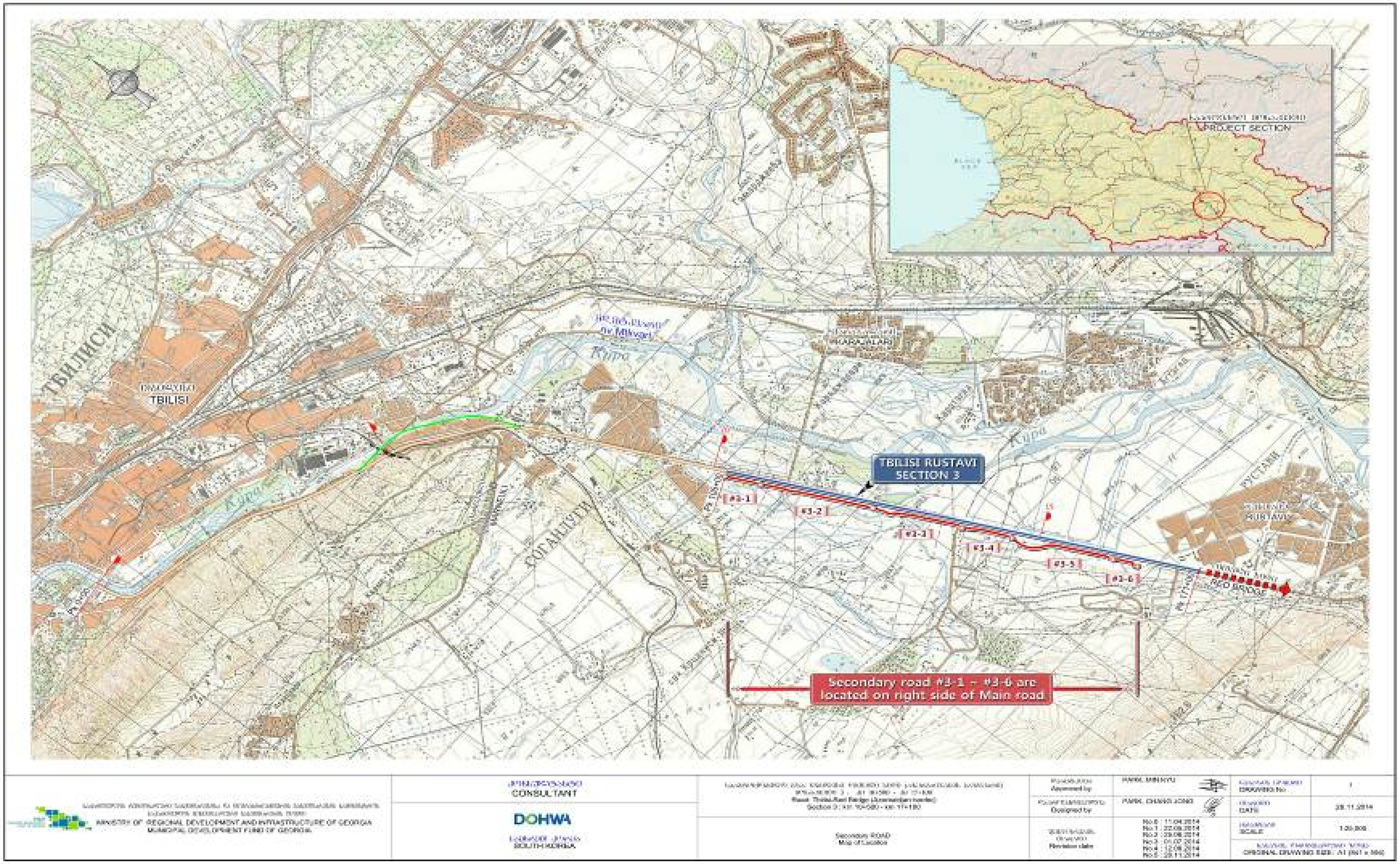

PROJECT SECTION
TBILISI
TBILISI RUSTAVI
SECTION 3
RUSTAVI
RED BRIDGE
#3-1
#3-2
#3-3
#3-4
#3-5
#3-6
Secondary road #3-1 ~ #3-6 are
located on right side of Main road
MINISTRY OF REGIONAL DEVELOPMENT AND INFRASTRUCTURE OF GEORGIA
MUNICIPAL DEVELOPMENT FUND OF GEORGIA
CONSULTANT
DOHWA
SOUTH KOREA
Secondary ROAD
Map of Location

Table 1: Detailed information of the Secondary road is as follows.

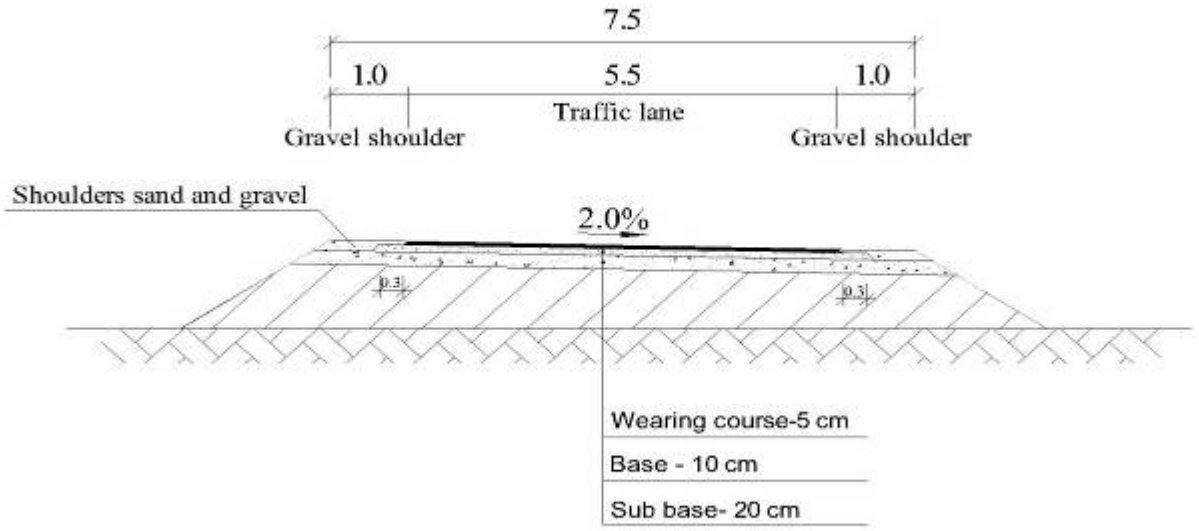
No	Location	Direction	Length(m)	Width(m)	Remarks
#3-1	Main road Pk. 105+00.0 ~ Pk. 110+00.0	Right	503.6	7.5	
#3-2	Main road Pk. 110+00.0 ~ Pk. 125+58.7	Right	1,562.1	7.5	
#3-3	Main road Pk. 125+77.4 ~ Pk. 138+25.4	Right	1,274.9	7.5	
#3-4	Main road Pk. 138+25.4 ~ Pk. 145+19.9	Right	703.4	7.5	
#3-5	Main road Pk. 145+19.9~ Pk. 159+17.2	Right	1,445.9	7.5	
#3-6	Main road Pk. 159+42.9 ~ Pk. 162+50.6	Right	340.6	7.5	
Total Sum			5,830.5		

2.5 Proposed Schedule for Implementation

Proposed implementation schedule will be prepared after design review.

2.6 Local Road Structure

According to TEM standard, the design speed, 120 km/h, 40 km/h is applied to main road and ramp respectively and also the design speed, 20 km/h. Also, 35m(Korean standard : at least more than 15m) is applied to Minimum radius of curve of Secondary road.



Width and pavement of Secondary road

Entire width of Secondary road is 7.5m width including 1.5m for pedestrians, which is taking into account width of the existing secondary road and access of local residents to car trading market. In addition, asphalt pavement is applied to the local road.

2.7 Engineering Structures

Box culvert for relocation of waterway

There is the water channel passing in parallel with existing main road in Section 3. Reinforce concrete culvert should be installed under Secondary road in order to sustain system of the water channel.

Box culvert type

Typical culvert type is as follows.

Typical Culvert Cross Section

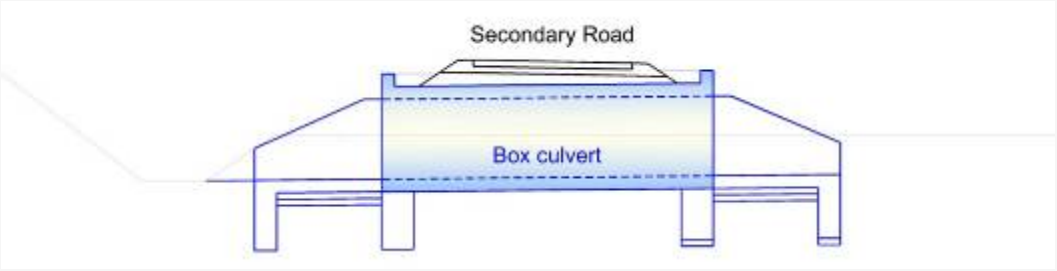


Table 2: List of Box culverts for existing waterway

No	Location	Length(m)	Size	Remarks
1	#3-1 Pk. 3+34.0	10.0	4.0x2.5	
2	#3-2 Pk. 4+16.0	10.0	4.0x2.5	
3	#3-2 Pk. 6+70.0	10.0	4.0x2.5	
4	#3-2 Pk. 9+18.0	10.0	4.0x2.5	
5	#3-2 Pk. 11+96.0	10.0	4.0x2.5	
6	#3-2 Pk. 13+91.0	10.0	4.0x2.5	
7	#3-3 Pk. 2+64.0	16.0	4.0x2.5	
8	#3-3 Pk. 7+59.0	9.0	2.0x1.5	
9	#3-4 Pk. 1+98.0	9.0	2.0x1.5	
10	#3-4 Pk. 7+04.0	12.0	1.0x1.5	
11	#3-5 Pk. 11+42.0	9.0	2.0x1.5	
12	#3-5 Pk. 13+84.0	9.0	2.0x1.5	
13	#3-6 Pk. 2+43.0	9.0	2.0x1.5	
Total Sum		133.0		

2.8 Utility Relocation

Utilities to be relocated are not yet exactly identified. Precise and detailed number of affected utility services will be identified during the construction. Based on tentative information, services to be relocated are the same as they are in IEE-2.

Road Furniture and Equipment Traffic regulations and safety

Installation of road signs, pavement marking, installation of guide posts and steel guardrails shall be done under the present project to ensure traffic regulations and safety.

Waste Classification

During the construction, the following types of waste will be produced:

- Household;
- Hazardous industrial;
- Non-hazardous industrial;
- Inert

2.9 Equipment Use during Construction

Table - 2.2 provides a list of the typical equipment that will be used to construct the Local Road. The actual machinery to be utilized for the construction will be the responsibility of the Construction Contractor. Any emission approvals required under the Georgian Law on Ambient Air Protection for temporary concentrations will be obtained on the basis of actually machinery used before construction begins.

Table 4: Typical List of Equipment for Construction Activity

Sl.No	Equipment Type and Characteristics	Minimum Number required
1.	Bull Dozer with Ripper	4
2.	Front loader	3
3.	Tipper-Dumper	6
4.	Motor Grader	2
5.	Truck Excavator	1
6.	Back Hoe	2
7.	Vibratory Roller	2
8.	Pneumatic Roller	1
9.	Tandem Roller	3
10.	Vibratory Screen	1
11.	Crusher	1
12.	Compressor	2
13.	Mobile Generator	2
14.	Water Tank with sprinkler	2
15.	Crane	1

2.10 Quarries

Identification of quarries and borrow pits is responsibility of the Civil Works Contractor (Contractor). Before startup of construction activities the Contractor has to define the quarries and borrow pits to be used and reflect this in the description of construction works and in work plans and specifications. At the same time, before engaging Contractor, the IEE report should describe existing opportunities for fill material supply and potential impacts related to exploration and transportation of materials. Here below, we describe several quarries and borrow pits located in the project area, which could be used for project.

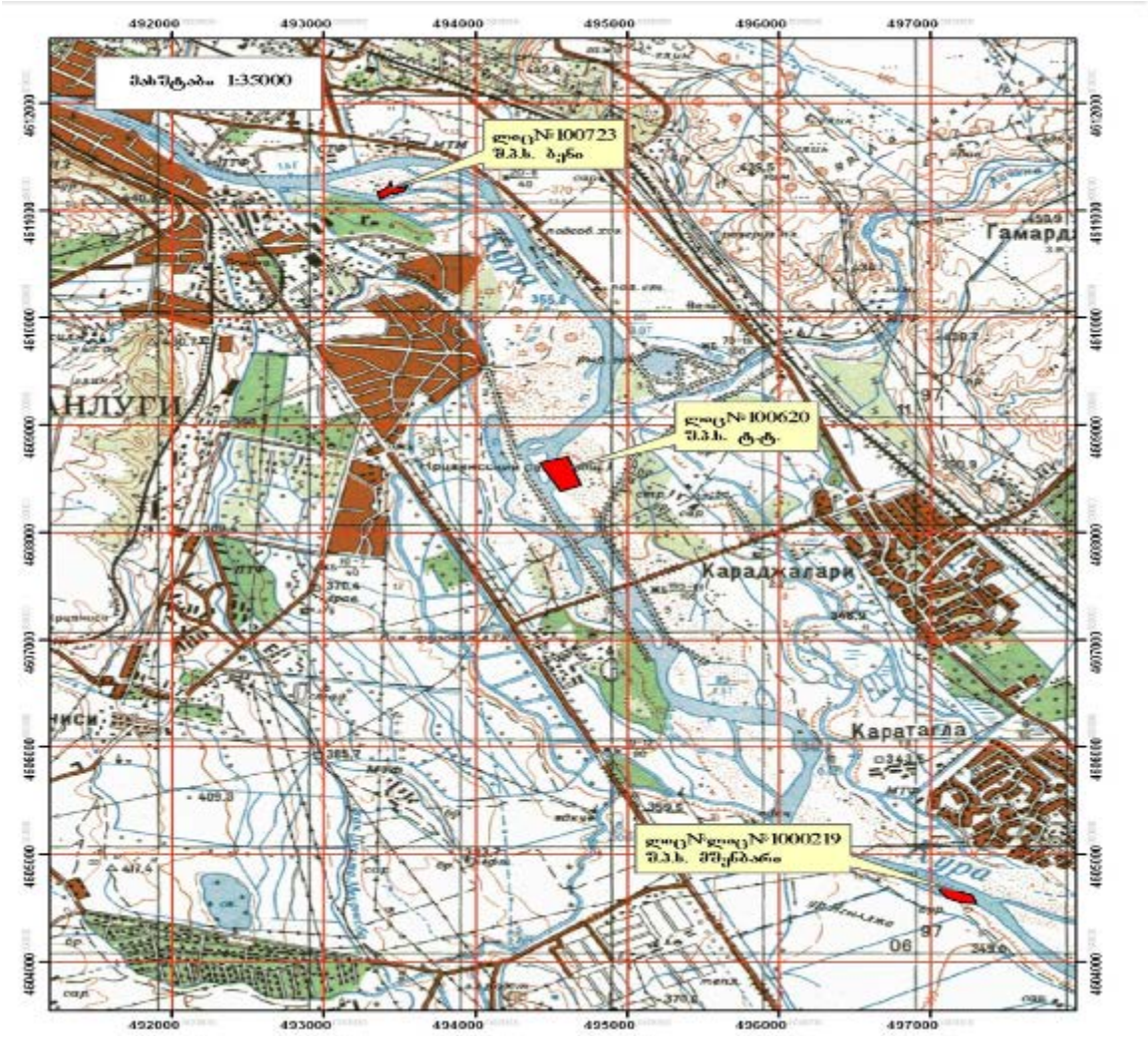


Figure- 2.10 Quarries and Borrow Pits in Project Area

2.11 Traffic Management during Construction

Road construction will not disrupt normal traffic operations and travelling through a construction zone for the main road. The contractor has to prepare detail traffic management plan mainly for construction of the junctions where the local traffic is concerned.

The primary consideration in work zone traffic control is safety. If driver can easily understand the traffic control and have adequate time to make decisions, they will operate their vehicle in a safe manner.

During construction access to driveways could temporary blocked by the construction zone, thereby affecting access and parking for the adjacent business and residences. Alternative access should be provided where feasible, with guide signs to inform the public.

The Contractor shall give written notification to all landowners, tenants, business operators, and residents along the right-of-way of the construction schedule, and shall explain the exact location and duration of each construction activity. Potential obstruction to their access shall be identified and alternative access provisions shall be made, if feasible.

Public information

Accurate and timely reporting of project information is a valuable element in the overall strategy for managing a work zone. The use of resources such as newspapers, radio, and television, can greatly improve the public's perception and acceptance of necessary delays and inconveniences. Key benefits of a public information program associated with construction activities are:

- Advance notice might encourage users to seek an alternative route around the project
- Advanced notice might encourage users to travel at off-peak times, or when construction sites are dormant
- Motorist acceptance might reduce speeding and other aggressive driving behavior in work zones

The propose traffic management scheme solves the traffic disruption problems within each of the subproject (section 3 Local Roads). However, the simultaneous execution of civil works on Tbilis-Phonichala and Phonichala-Rustavi subsections may create additional traffic problems.
To minimize these risks we propose to split construction schedules in a way that intensive works on critical sites are carried out at one section at the same time.

3. GOVERNMENT POLICY LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 Introduction

Environmental legislation of Georgia comprises the Constitution, environmental laws, international agreements, bylaws, presidential decrees, ministerial orders, instructions, regulations, etc. Georgia is a party to international conventions, including the environmental ones. Below is a list of Georgia's environmental legislation as it pertains to the proposed project:

Year	Law/Regulation
1994	Law on Soil Protection (amend. 1997, 2002)
1996	Law on Entrails (amend. 1999, 2002, 2004, 2005)
1996	Law on Environmental Protection (amend. 2004)
1997	Law on Wildlife (amend. 2001, 2003, 2004)
1997	Law on Water (amend. 2003, 2004, 2005, 2006)
1999	Law on Protection of Atmospheric Air (amend. 2000, 2007, 2008)
1999	Forestry Code of Georgia (amend 2000 2001, 2003, 2005, 2006)
1999	Law on Compensation of Damage from Hazardous Substances (amend 2002, 2003)
2002	Regulation on Environmental Impact Assessment approved by Order No. 59 of the Minister of Environment.
2005	Law on Red List and Red Book of Georgia (amend. 2006)
2005	Law on Licenses and Permits
2007	Law on Environmental Impact Permit
2007	Law on Ecological Expertise
2007	Law on Service of Environmental Protection
2007	Law on Public Health
2011	Methodology for Estimation of Environmental Damage

Laws and regulations related to social and land ownership aspects applicable to the project include:

Year	Law/Regulation
1997	Civil Code of Georgia
1997	Law on Compensation of Land Substitute Costs and Damages due to Allocating Agricultural Land for Non-Agricultural Purposes
1999	Law on Rules for Expropriation of Ownership for Necessary Public Needs
2005	Law on Privatization of State-owned Agricultural Land
2005	Law on Registration of Rights to Real Estate
2007	Law on Cultural Heritage
2007	Law on Public Health
2007	Law on Entitlement of Ownership Rights to Lands Possessed (Employed) by Physical and Legal Persons of Private Law

Other laws relevant to the project:

Year	Law/Regulation
1994	Law on Roads
1999	Law on Traffic safety
1999	Law on State Complex Expertise and Approval of Construction Projects
1999	Law on Licensing Design-Construction Activities
2006	Law on Regulation and Engineering Protection of Coastline and River Banks

Below is a brief description of the environmental permitting process in Georgia, ADB safeguard requirements, and the differences between two systems.

3.2 Georgian Legislation Related to Environmental Permitting

At present, the environmental permitting procedure in Georgia is set out in three laws: The project proponent, in implementing projects, will comply with (i) The Law on Licenses and Permits (2005); (ii) The Law on Environmental Impact Permits (EIP), and (iii) The Law on Ecological Examination (EE) 2008.

In line with the mentioned laws, a provision "On the environmental Impact Assessment" is proved by Decree No. 14 of October 4, 2011 of the Minister of Environment and regulates the legal relations associated with the assessment of environmental impacts.

The Law on Licenses and Permits was adopted by Parliament of Georgia, on June 24, 2005. The new Law regulates legally organized activities posing certain threats to human life and health, and addresses specific state or public interests, including usage of state resources. It also regulates activities requiring licenses or permits, determines types of licenses and permits, and defines the procedures for issuing, revising and canceling of licenses and permits (Article 1, Paragraph 1).

The Laws on Environmental Impact Permit and Ecological Examination: The Laws published on 14.12.2007 and in force since 01.01.2008. These new laws integrated all recent Georgian legislation.

The Law on Environmental Impact Permit: The Law of Georgia on Environmental Impact Permit determines the complete list of the activities and projects subject to the ecological examination (clause 4 p.1) and the legal basis for public participation in the process of environmental assessment, ecological examination and decision making on issuance of an environmental impact permit.

In case if the activity included into the list given in clause 4 p.1 at the same time requires Construction Permit, the administrative body responsible for issuance of the Construction Permit ensures involvement of MoE, as a separate administrative body, in the administrative procedures initiated for the purpose of issuing Construction Permit, as it is envisaged by the Law on Licenses and Permits. In such cases the MoE is issuing the Conclusion on the Ecological Examination of the project based on the documentation provided to MoE by the administrative body issuing the Permit. The Conclusion on the Ecological Examination is adopted by the administrative (executive) legal act of the MoE and compliance with the conditions of the Conclusion is obligatory for the project proponent. The conditions of the Conclusion on Ecological Examination are a part of conditions of the Construction Permit.

In case if the activity included into the list given in clause 4 p.1 does not require Construction Permit, based on the Conclusion on the Ecological Examination the MoE will issue the Environmental Impact Permit, supported by the administrative (executive) legal act issued by the minister. The ecological examination is carried out in accordance with the law of Georgia on Ecological Examination and the conditions set forth by the Conclusion present the Conditions of the Permit.

The aforementioned laws do not provide details of screening procedure and do not define the responsibilities of parties. Screening of project proposals, preliminary assessment of environmental impact and proposed mitigation measures (scoping) are carried out by the project

proponent in consultation with the MoE.

Current Legislations Related to Environmental Permitting

Below is the list of laws relevant to environmental protection:

1994	Soil Protection
1996	System of Protected Ares
1996	Minerals
1996	Environmental Protection
1997	Wildlife
1997	Tourism and Resorts
1997	Water Protection
1997	Transit and Import of Hazardous Waste within and into the Territory of Georgia
1998	Resorts and Sanitary Protection of the Resort Zones
1998	Dangerous Chemical Substances
1998	Pesticides and Agrochemicals
1999	Atmospheric Air Protection
1999	Forest Code
2003	Red List and Red Data Book of Georgia
2005	Licensing and Permitting
2007	Environmental Impact Permit
2007	Ecological Expertise
2007	Cultural Heritage

Public Consultation Procedures

Clause 6 of the Law on Environmental Impact Permits provides detailed requirements and procedures for conducting public consultations and establishes timeframes for information disclosure and discussion. According to Article 6, the developer is obliged to carry out public discussion of the EIA before its submission to an administrative body responsible for issuing a permit. Where an activity requires a construction permit this must be done before initiating stage 2 of the process for issuing a construction permit. The detailed description of Public Disclosure requirements is discussed more fully in this document in Chapter 9 on Public Consultation and in Annex 1.

Procedure of Official Submission of EIA/IEE to MoE

Article 8 of the Law on Environmental Impact Permits specifies the documents which must be submitted by an operator to obtain a permit:

(1) A written statement to the Ministry under the rules established by ‘Law of Georgia on Licenses and Permits’.

(2) The following information:

(a) An EIA/IEE report drawn up under the standards specified by the legislation of Georgia [in 5 hard copies and 1 soft copy]

(b) A situation plan of the planned activity (with the indication of distances)

(c) Volume and types of the expected emissions (a technical report of inventory of the stationery sources of pollution and emitted/discharged harmful substances and project of maximum permissible concentrations of emitted/discharged harmful substances [in 4 copies])

(d) A brief description of the activity (as a technical summary)

(e) A statement about the confidential part of the submitted statement.

(3) An operator is obliged to submit a full diagram of the technological cycle to the permit issuing body even if the given activity contains a commercial and/or state secret. This part of the statement, according to sub-clause 'e' of clause 2 of the given Article should be submitted separately by the operator.

Issuance of the Permit on Environmental Impact

Article 9 of the Law on Environmental Impact Permits describes the procedures for issuing an Environmental Impact Permit. The issue is also addressed in the laws of Georgia on "Licenses and Permits" (2005) and "on Ecological Examination' (2008).

1. According to the law on "Licenses and Permits," the MoE takes a decision on issuing
2. Permit within the 20 days of the permit request by the project proponent.
2. MoE, in accordance with the law on Ecological Examination, ensures the quality of the submitted documentation and the Issuance of Conclusion on Ecological Examination.

Either the Environmental Permit or Construction Permit (when the latest is required) is issued only in case of the positive conclusion of the Ecological Examination.

Regulation on EIA issued by the MoE dated October 4, 2011

The Provision is proved by Decree No. 14 of October 4, 2011 of the Minister of Environment and regulates the legal relations associated with the assessment of environmental impacts. The procedure to assess the environmental impact includes drafting the confirmatory documentation and permits for the businesses on the legally established list, identifying any source of expected environmental impact, its nature and degree and integrated assessment of their environmental, social and economic outcomes in obtaining the environmental expert conclusion.

The given Provision defines the procedure to draft the environmental assessment report by a business actor to ensure the environmental and social-economic balance of future economic development. It precedes the decision of the Ministry of Environmental Protection of Georgia about the purposefulness of the business and relevant project to be implemented by the business actor.

The assessment of the environmental impacts covers the identification and description of direct and indirect impacts in the context of the planned activity and study of their outcomes on:

- human's residential space and health; vegetation cover and fauna;
- natural and modified eco-systems; landscapes, air, water, soil, climate;
- historical monuments and cultural values;
- social-economic factors;
- assessment of the existing state of geological and hydrological environments and expected risks.

The objects of environmental assessment are the activities on the list under clause 1 of article 4 of the Georgian Law "On Environmental Permit".

The content of the EIA document is specified in the clause 5 of the Regulation as follows:

Article 5. Content of the environmental impact assessment

The Environmental impact assessment report should include the following information:

(a) Analysis of the existing state of the environment;

(b) Identifying the sources, kinds and objects of impact caused by the activity;

(c) Forecast of the changes of quantitative and qualitative characteristics of the environment;

(d) Determining the probability of emergency situations due to the activity and evaluating the expected results;

(e) Evaluation of the environmental, social and economic results of the planned activity;

(f) Specifying the reduction measures for the negative impact on the environment and human health and specifying the compensation measures as necessary;

(g) Identifying the residual (cumulative) impact and measures for its control and monitoring;

(h) Undertaking environmental and economic evaluation of the projects;

(i) Analysis of the alternative variants of the project implementation, selection and forming new variants;

(j) Identifying the ways and means to restore the initial environmental condition in case of terminating entrepreneurship or other activity;

(k) Informing the society and studying the public opinion;

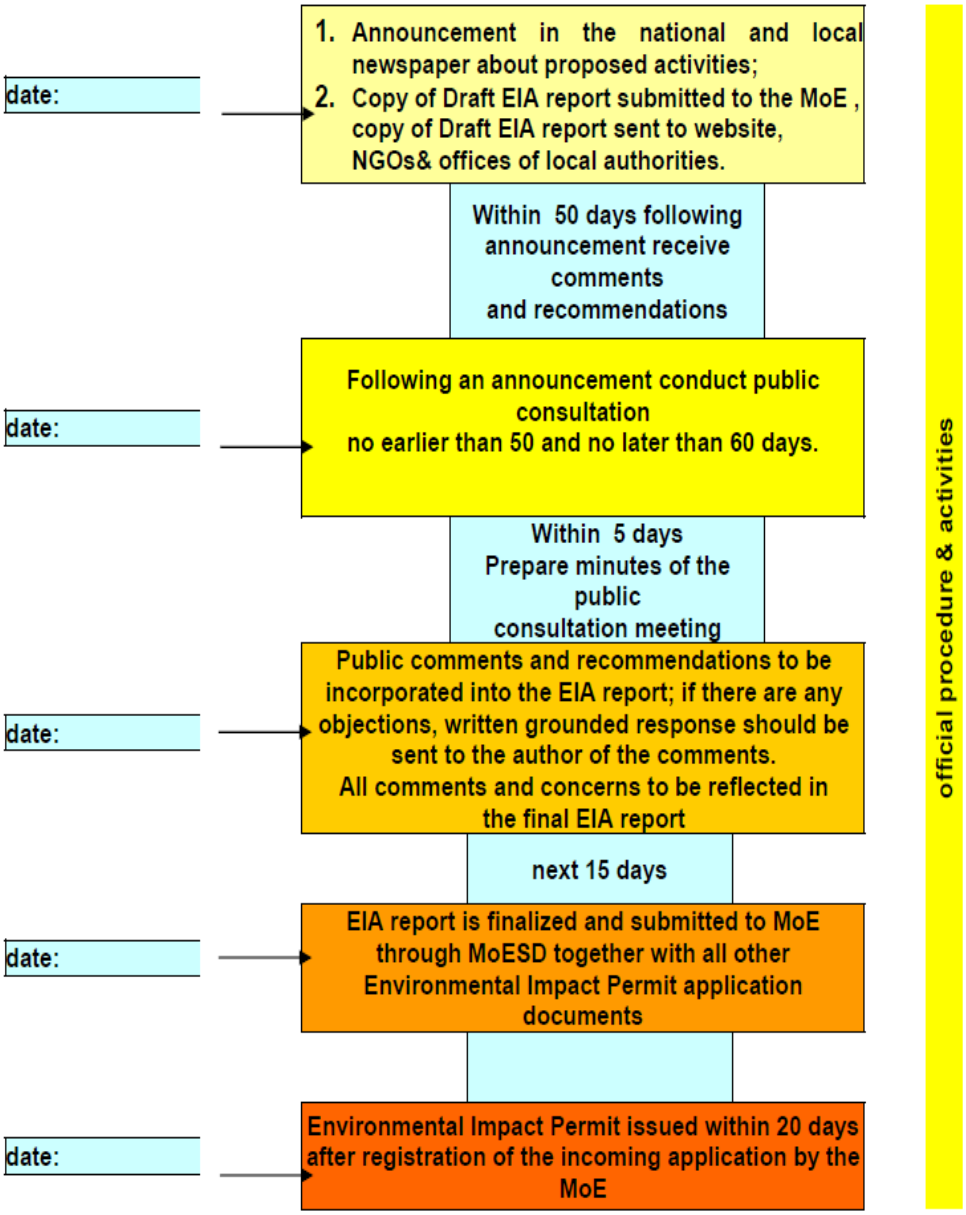
(l) Plan for the post-project situational analysis;

(m) Identifying the kinds and quantities of the expected emissions;

(n) Forecast of the expected environmental state gained through the environmental impact factors;

Decree also requires development of the Monitoring Plan during the implementation of the project and at the end of the activity.

Figure 3.1 Disclosure and Environmental Impact Permit Procedure



Rules for Construction Projects by Government Ministries

In accordance with paragraph 1a of the Decree N 160 of the Georgian Government (08/23/2006), where construction is carried out by a Ministry of the Government of Georgia or

an entity acting on behalf of Ministry, no Permit for the Construction is required to be formally issued. The project documentation and the review procedures should, however, comply with the requirements set forth under the Rules and Conditions for Issuing Construction Permit as described above.

3.3 ADB Environmental and Social Safeguards Requirements (SPS 2009)

According to ADB Safeguard Policy Statement (2009) and Operational Manual Fl (2010), the Project is classified as category "A" and therefore an EIA is required for the Project. The process of determining a project's environment category is to prepare a Rapid Environmental Assessment (REA). REA requires the completion of the environmental categorization form prior to the project initiation. REA uses sector-specific screening checklist, taking into account the type, size, and location of the proposed project; sensitivity and vulnerability of environmental resources in project area; and the potential for the project to cause significant adverse environmental impacts. A project is classified as one of the four environmental categories (A, B, C, or Fl) based on the most environmentally sensitive component. Categories are as follows:

Screening and Categorization. ADB will carry out project screening and categorization at the earliest stage of project preparation when sufficient information is available for this purpose. Screening and categorization is undertaken to (i) reflect the significance of potential impacts or risks that a project might present; (ii) identify the level of assessment and institutional resources required for the safeguard measures; and (iii) determine disclosure requirements.

Environment Categorization. ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

(i) **Category A.** A proposed project is classified as category **A** if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.

(ii) **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category **A** projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category **A** projects. An initial environmental examination is required.

(iii) **Category C**. A proposed project is classified as category **C** if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

(iv) **Category FI**. A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI (paras. 65-67).

Involuntary Resettlement: ADB will screen all projects to determine whether or not they involve involuntary resettlement. For a project involving involuntary resettlement, a resettlement plan will be prepared that is commensurate with the extent and degree of the impacts. The degree of impacts shall be determined by (i) the scope of physical and economic displacement, and (ii) the vulnerability of the affected persons. For FI projects, see paras. 65-67.

Information Disclosure: In line with ADB's Public Communications Policy, ADB is committed to working with the borrower/client to ensure that relevant information (whether positive or negative) about social and environmental safeguard issues is made available in a timely manner, in an accessible place, and in a form and language(s) understandable to affected people and to other stakeholders, including the general public, so they can provide meaningful inputs into project design and implementation. ADB will post the following safeguard documents on its website:

(i) for environment category A projects, draft environmental impact assessment reports at least 120 days before Board consideration;

(ii) draft environmental assessment and review framework, draft resettlement frameworks and/or plans, and draft Indigenous Peoples planning frameworks and/or plans before project appraisal;

(iii) final or updated environmental impact assessments and/or initial environmental examinations, resettlement plans, and Indigenous Peoples plans upon receipt;

(iv) environmental, involuntary resettlement, and Indigenous Peoples monitoring reports submitted by borrowers/clients during project implementation upon receipt.

3.4 EIA Requirements under Georgian and ADB Procedures

The following Table presents EIA requirements under Georgian and ADB procedures

Table 3.1 EIA Requirements under Georgian and ADB Procedures

#	Action	Georgian Legislation	ADB Requirements
1.	Screening	Project Proponent in consultation with MoE	Bank and Consultant hired by Project Proponent
2.	Scoping	Not required. Could be conducted voluntarily by Project Proponent	Obligatory. Bank and Consultant hired by Project Proponent
3.	Draft EIA	To be prepared by Environmental Consultant.	To be prepared by Environmental Consultant.
4	Public Consultations	The EIA should be available for public review during 45 days. Publication of information in central and regional mass-media. Arrange consultation not later than 60 days from the date of publication.	At least two consultations for Category A projects – one at the scoping stage and one for the draft EIA.
5.	Final EIA	Consider all comments received during public consultations, incorporate accepted remarks and explain rational when the	Consider all comments from Bank and public. Agree with the Bank on each

		comments are disregarded.	raised point. Incorporate accepted public comments and explain rational when the comments are disregarded.
6.	Management Plans	No clear guidelines on format, content and timing	Incorporate Monitoring and Management Plans in the EIA.
7.	Review and Approval	MoE	Bank and separately - MoE (if the EIA is required by Georgian legislation)
8.	Disclosure of final EIA	Not requested	Publication (mainly electronic) of the final EIA.

3.5 Environmental Screening for Current Project

In line with the legislation of Georgia, the activities related to the construction or reconstruction of the International and National motor roads and highways needs an Environmental Impact Permit to be issued and an Environmental Impact Assessment to be drafted.

The project is not related to the development of new territories or construction on the sensitive environmental sites. The project envisages the modernization of the existing road, i.e. its widening from a 2-lane road to a 6-lane road and construction of relevant infrastructure. Under ADB SPS 2009 - Provision on the Environmental and Social Safety Policy, the project belongs to category B. Preparation of the Initial Environmental Examination document is required for B category projects.

The format of required IEE for ADB and EIA for Ministry of Environment of Georgia is very similar, with some minor differences. In order to harmonize the ADB and Georgian requirements, one environmental assessment document will be prepared. It will be prepared in the ADB IEE format and in compliance with the requirements of Regulation on EIA issued by the MoE dated October 4, 2011. The Georgian version will be entitled as EIA.

Public consultation is necessary in line with the legislation of Georgia and requirements of ADB SPS 2009.

3.6 Administrative Framework

3.6.1 MDF and the Roads Department (RD or RDMRDI)

MDF

MDF has overall responsibility for the Project. This includes Environmental Management and the financing and supervision of all LAR tasks and for cross-agency coordination. MDF will exercise its functions and will be responsible for the general management of the planning and supervision to ensure implementation of all safeguards tasks.

MDF will be responsible for all LAR tasks both at central and local government level. Among other tasks MDFG will be responsible for (i) screening the projects and ensuring that the LARPs are sent to ADB for review, (ii) hiring and supervising the consultants that will prepare/execute the LARPs; (iii) establishing needed LAR capacity in each Municipality where LAR is relevant; (iv) ensuring proper internal monitoring; and (v) hire, following ADB recommendation, the external monitoring agencies. MDFG will also provide all needed documentation to ensure the prompt allocation of LAR budgets from the Government of Georgia and further payments to the APs, will maintain the coordination on all LAR related activities, and will engage in training as needed. In order to give MDFG the needed capacity to carry out these multiple and complex tasks the Program will provide to the MDFG the needed training.

The Roads Department of Ministry of Regional Development and Infrastructure (RD or RDMRDI) is responsible for elaboration of policy and strategic plans related to developing motor roads, management of road and traffic related issues and construction, rehabilitation, reconstruction and maintenance of the roads of public use of international and national significance, utilizing funds from the state budget, lawns, grants and other financial sources.

Thus, the RDMRDI is responsible for the implementation of road operation and maintenance tasks in relation with the current project.

3.6.2 Ministry of Environmental Protection (MOE)

Recent changes in the administrative structure, adopted by the Decree No 93 of the Government of Georgia dated 25.04.2013, resulted in redistribution of responsibilities between the Ministry of Environmental Protection (MoE) and the Ministry of Energy and Natural Resources and are reflected in current titles of the mentioned ministries. The MoE is renamed as the Ministry of Environmental Protection and Natural Resources (MoEPNR) and the Ministry of Energy and Natural Resources is now titled as the Ministry of Energy. The MoEPNR is considered as a leading ministry responsible developing the environmental policy of the government. The MoEPNR consists of several functional departments, which are responsible for different aspects of environmental protection, and other supporting departments, like administrative department, Legal Department, PR Department etc. Functional departments and their responsibilities:

Department of Permits	- Carrying out Ecological Expertise and issuing Environmental permits - Post EIA monitoring of compliance with the conditions of Environmental Permit
Department of Environmental Policy and International Relations	Development of the State Policy and State - Environmental Programs

Department of Integrated Management of Environment	- Ambient air and water protection strategy - Consent on the Reports of "Inventory of Stationary Sources of Emissions" and "Norms of Maximally Admissible Emissions" - Consent on the Report on "Norms of Maximally Admissible Discharges" - Consent on the technical regulations for Water Intake from the Surface Water Objects - Waste Management - Hazardous Substance Management - Climate change control - Environmental Standards and Norms
Biodiversity Protection Department	- Biodiversity protection policy and programs
Legal Department	- Development of Environmental Legislation
Agency of Protected Areas	- Protected areas development policy and programs
Environmental Agency	- Hydrometeorology - Pollution Monitoring - Geohazard monitoring - Monitoring of geo-ecological conditions of river basins, water reservoirs, Black Sea territorial waters, continental

As a result of recent reorganization of the ministries, two new entities have been created within the MoEPNR: National Forestry Agency and Department of Environmental Supervision.

The functions and responsibilities of the ex- Department of Natural Reources of the Ministry of Energy have been redistributed among the Department of Environmental Supervision, National Forestry Agency and National Environmental Agency (all under the MoEPNR) and State Agency on Oil and Gas. The National Environmental Agency is managing following environmental issues:

- Issuance of licenses on exploration of natural resources (except gas and oil). This includes also licenses for quarries and borrow pits supplying the road projects with the inert construction materials

Nuclear and Radiation Safety Department is responsible for

- Development of Nuclear and Radiation Safety Policy
- Radiation Safety Control

Department of Environmental Supervision is responsible for execution of control over the environmental protection and use of natural resources. In particular, responsibilities of the Department cover matters like:

- Inspection of compliance with the natural resource use regulations

Inspection of compliance with the conditions of Environmental Impact Permit

In relation with the road projects, first of all it should be mentioned that Ministry of Environmental Protection is in charge of issuing Environmental Impact Permits. MoEPNR is also carrying responsibilities for the post EIA monitoring, although the efficient monitoring system still needs to be developed. MoEPNR is responsible for issuing licenses for quarries and borrow pits.

3.6.3 Ministry of Economy and Sustainable Development (MoESD)

MoESD is responsible for carrying out the review of technical documentation (including conclusion of independent experts) and issuing Permits on Construction for projects, as well as for supervision over constructing activities and for arranging Acceptance Commission after completion of construction.

State supervision of construction and compliance monitoring is provided by the Main Architecture and Construction Inspection (MACI), which is operating under the Ministry of Economy and Sustainable Development of Georgia.

3.6.4 Other Responsible Governmental Institutions

The Ministry of Culture, Monument Protection and Sports is responsible on supervision of the construction activities in order to protect archaeological heritage. In case if construction is to be carried out in a historic sites or zones of cultural heritage, consent of the Ministry of Culture, Monument Protection and Sport is also required for issuing construction permit.

The “National Service for the Foodstuffs Safety, Veterinary and Plant Protection” of the Ministry of the Agriculture is responsible for implementation of complex sanitary protection measures in case of identification burial sites during earthworks. Information about suspicious burial sites should be delivered to the “National Service for the Foodstuffs Safety, Veterinary and Plant Protection” of the Ministry of the Agriculture by the Construction Contactor (field environmental officer) and RDMRDI field officer.

3.7 International Treaties and Conventions

3.7.1 The Convention on Biological Diversity, 1994

International cooperation is a dominant feature and driving force for environmental reforms in Georgia. Setting the goal to preserve its biological diversity and realising the importance of international cooperation, Georgia signed the Convention on Biological Diversity in 1994. Thus, accepting responsibility to safeguard the nation’s rich diversity of plant, animal, and microbial life to begin using biological resources in a sustainable way and to ensure equitable sharing of benefits from biodiversity**.**

The Convention on Biological Diversity is the first global agreement, which, along with biodiversity conservation, necessitates the sustainable use of biological resources. Georgia has been recognized as holding an important reservoir of biodiversity, which is very important in the global context -according to the surveys and assessments conducted at an international level, Georgia as a part of the Caucasus, is recognized as:

- One out of 34 biologically richest and endangered land ecosystems (Conservation International);
- One out of 200 vulnerable eco-regions (WWF);
- One out of 221 endemic bird habitats (Bird Life International);
- One of the World Agro biodiversity Centers**.**

4. DESCRIPTION OF THE ENVIRONMENT

4.1 Physical Resources in Project Area

4.1.1 Climate

The designed section of the road is entirely located on the Kvemo Kartli lowland dry subtropical climate zone with moderate cold winter and hot summer (IIIb sub-region according to the construction-climate zoning). The separate climate elements are characterized by the data from Rustavi and Phonichala meteorological stations that are located nearby to the route on 374m and 441 m.

The average annual air temperature is 13,0-12,7^{0}C. January is the coldest month with average temperature 0,8-0,8^{0}C. Frosts are likely from November to March. Absolute minimal temperature is -19, 5 and -23 ^{0}C. July and August are the warmest months with average temperature 25,0 and 24,4^{0}C. Maximal temperature is 39 and 40 ^{0}C.

Average air temperature ^{0}C

Meteorological station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Rustavi	0.8	2.6	6.6	11.9	17.5	21.6	25.0	25.0	20.3	14.4	7.7	2.6
Phonichala	0.8	2.6	6.5	11.8	17.3	21.1	24.4	24.6	19.6	13.8	7.6	2.8

The annual precipitation is 437-550 mm. maximal precipitation is fixed on May-June, minimal in August and December-January. The average annual number of humid days is 89 and 142 days, and daily maximum of precipitation is 188 mm. Snowy winter is rare. The snow cover several centimeters height does not formed.

Average distribution of precipitation, mm

Meteorological station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Rustavi	19	22	36	44	70	60	29	30	36	37	33	21

The average annual relative humidity index is 66 %. The average number of more than 80% relative humidity is 39 per year and their maximal amount is 71.

In both cases north-west winds are dominant (-49%). North winds are - 8%, north-east - 4%, east -7%, south-east -12%, south -10 %, south-west -3%, and west -7%. 18% of total amount of observation is calm. The average annual highest and lowest speed of the wind is 5, 8/1,7m/sec. in January and 8,2/3/5 m/sec in July. The normative values of wind pressure per 5 and 15 years is 0, 48-0, 48 and 0, 60-0, 60 kPa.

Possible highest speed of wind mm/sec

Station	Once per year	5 time per year	10 time per year	15 time per year	20 time per year
Rustavi	25	29	31	32	33
Phonichala	24	28	30	32	33

The thunderstorm on the projected area likely from April to December with maximal intensity in May-June. The hail is rare and likely in April-September. The fog is mostly characterized for cold period of the year, especially in January. Storm and frosted soils are not characterized.

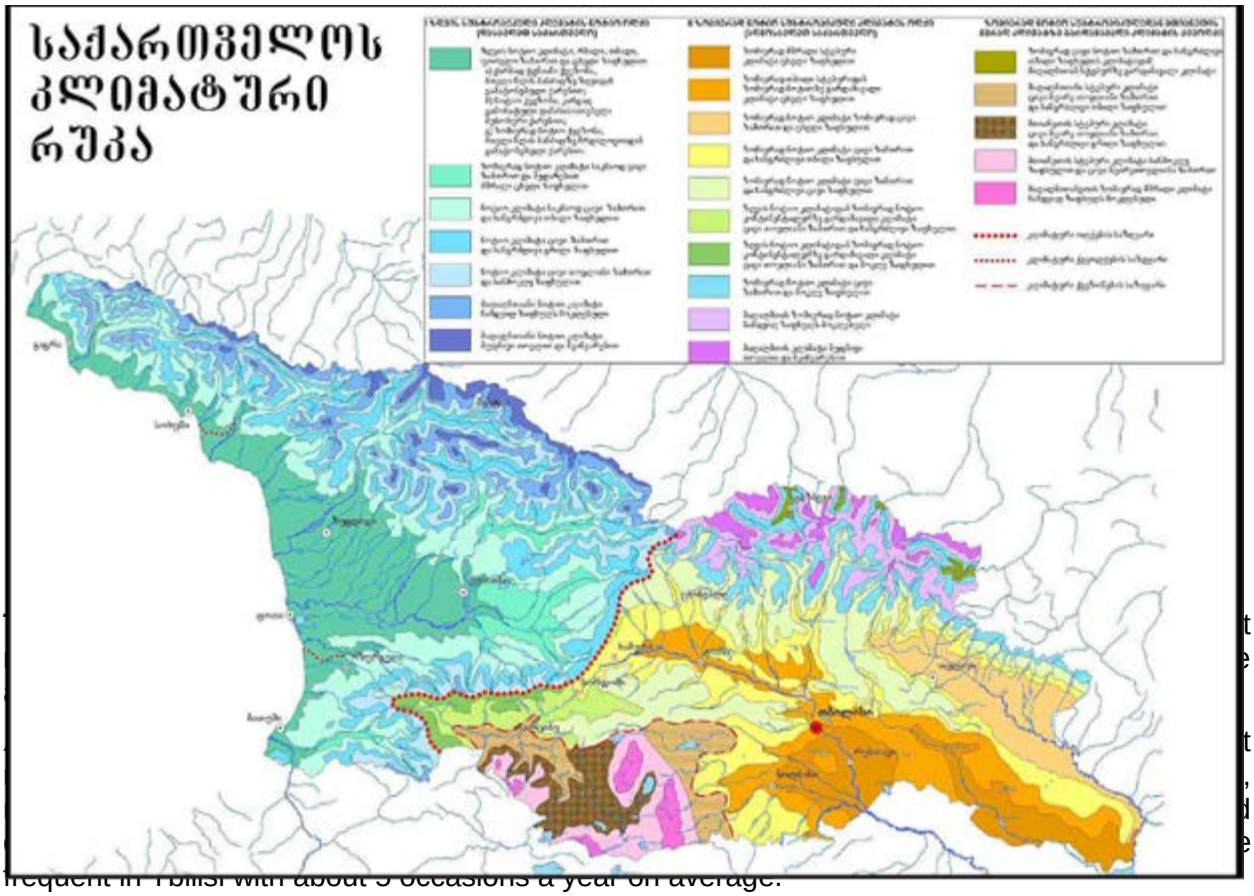
The special atmospheric events during the year, day

Meteo	thunderstorm	Hail	Fog

station	average	maximal	average	maximal	average	maximal
Rustavi	-	62	0.6	-	13	-

According to the climatic zoning, the cities of Tbilisi and Rustavi are included in the moderately humid subtropical climatic zone. The territory of the design road is characterized by moderately warm climate, transient from steppe to moderately humid (with hot summer and moderately cold winter). Below, we give the brief climatic description of the area:

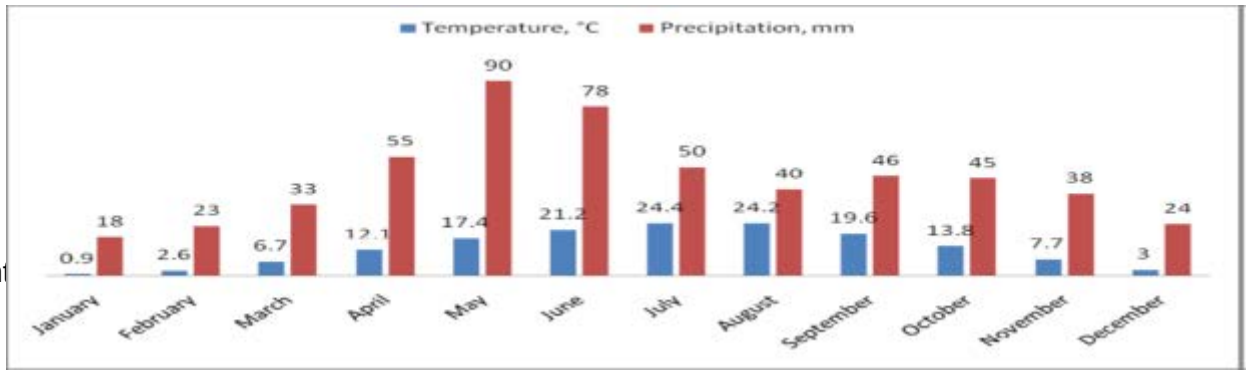
Fig 4.1Georgian climate map



frequent in Tbilisi with about 3 occasions a year on average.

In the Diagram below we give detailed information about the average monthly temperature and precipitation frequency in Tbilisi:

4.1Chart
Average mont

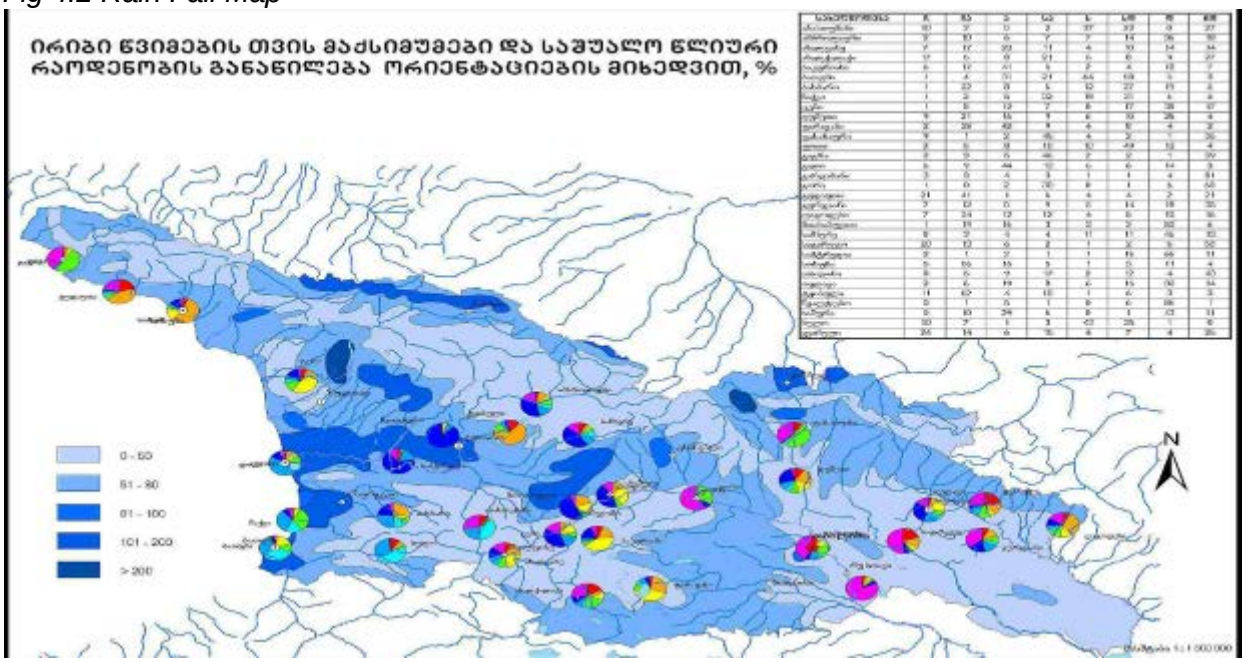


The main climatic characteristics are given in the tables below.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Peak high °C	19.5	22.4	28.7	34.3	34.9	38.7	40.0	40.3	37.9	33.3	27.2	24.0	40.3
Average high °C	6.0	7.4	12.1	18.2)	23.4	27.5	30.8	30.8	26.0	19.8	12.9	7.5	18.7
Average low °C	-2.2	-0.9	2.4	7.4	12.2	15.7	19.0	18.6	14.7	9.2	4.1	-0.2	8.4
Peak low °C	-24.4	-14.8	-12.8	-4.8	1.0	6.3	9.3	8.9	0.8	-6.4	-7.1	-20.5	-24.4
Precipitations, mm	19	26	30	51	78	76	45	48	36	38	30	21	498

The tables below show the climatic data based on the continuous observations (1881-1960) of Tbilisi weather station.

Fig 4.2 Rain Fall Map



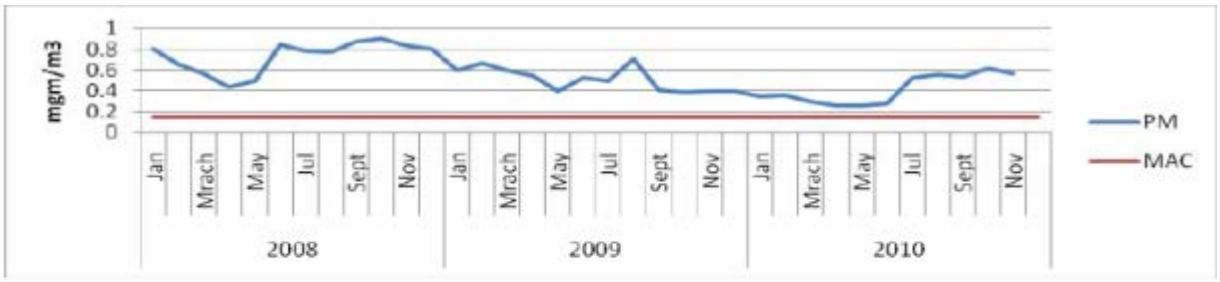
4.1.2 Air Quality

The available data on the air quality in Tbilisi

At present the National Environmental Agency monitors the air quality in Tbilisi in three points located in Agmashenebli, Tsereteli and Moscow avenues. The last two ones were installed in 2009 and at present only CO and SO^2 concentrations are measured. The observation point at Agmashenebeli Avenue is in a relatively better condition measuring the following parameters of the ambient air: the total amount of particulate matter, carbon oxide, Nitrogen dioxide (NO2), lead (Pb) and low level ozone concentrations.

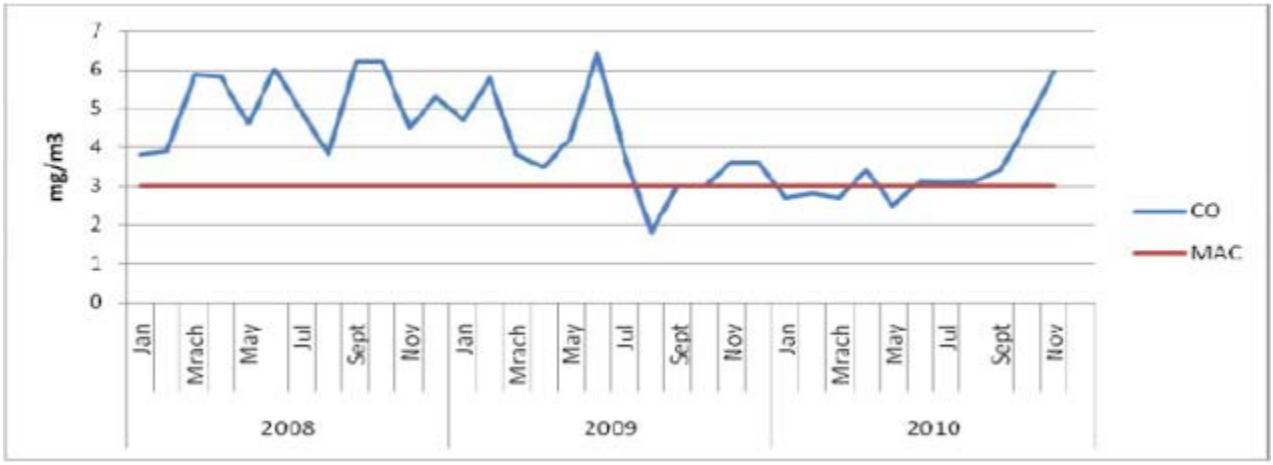
4.2 – 4.6 Charts show the ambient air pollution levels in Agmashenebeli Avenue observation point.

4.2 Chart. Average monthly concentrations of particulate matter (PM) measured in Agmashenebeli Avenue in 2008-2010. They are compared with the average daily maximum allowable concentrations.

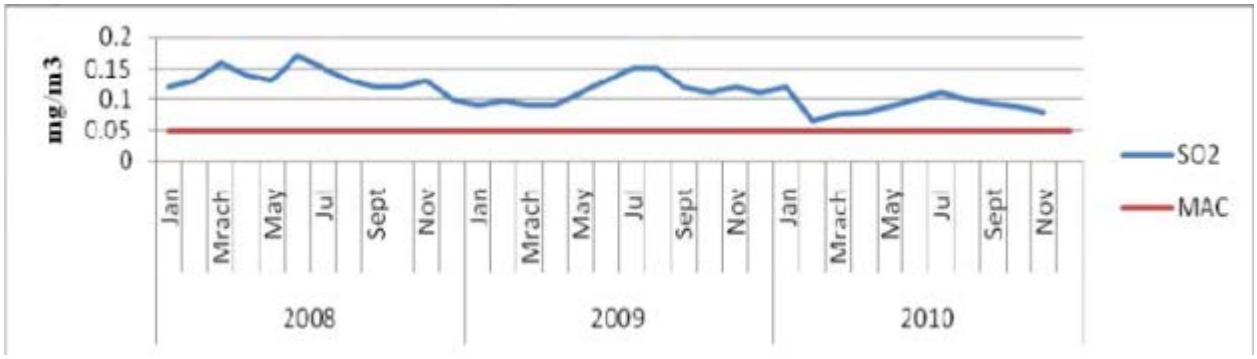


4.3 Chart. The average monthly concentration of carbon oxide (CO) in Agmashenebeli Avenue in 2008-2010. They are compared with the average daily maximum allowable concentrations.

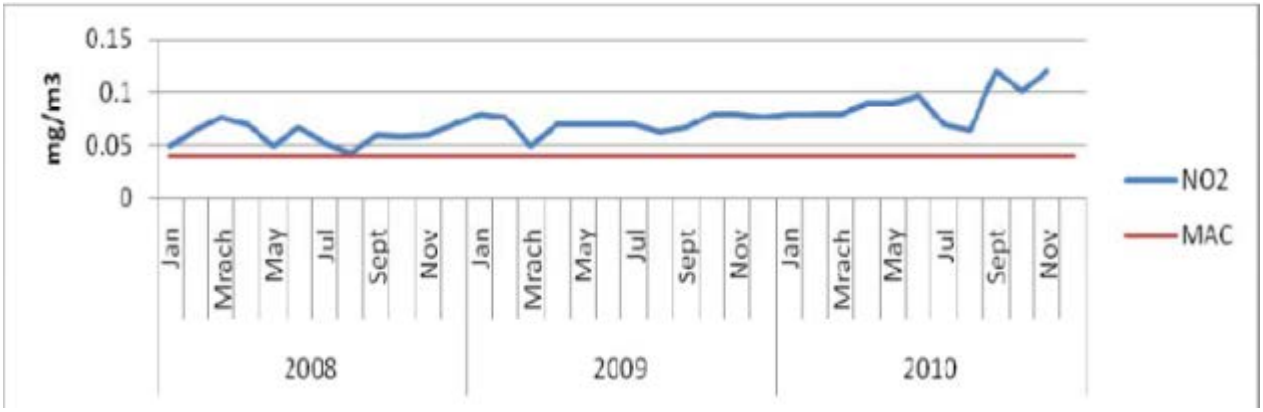
Table 4.1b Climatic data for Tbilisi



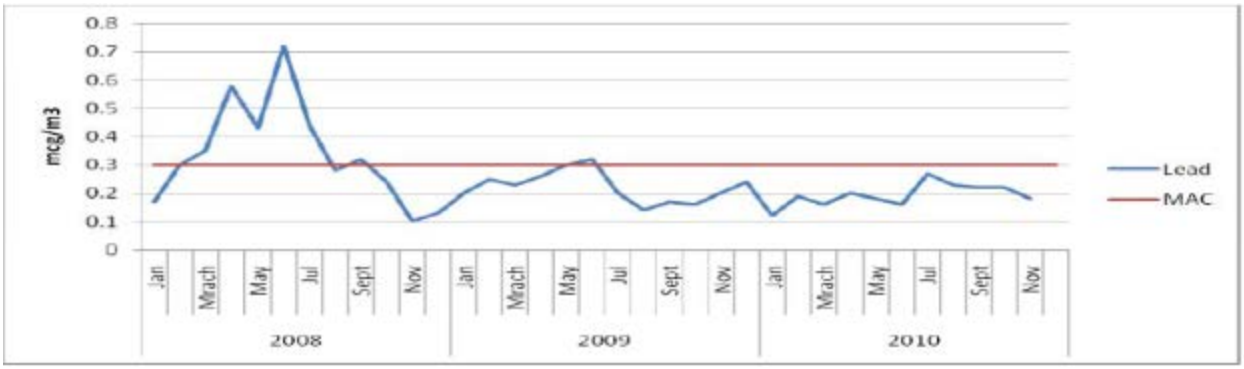
4.4 Chart. The average monthly concentration of sulphur dioxide (SO2) in Agmashenebeli Avenue in 2008-2010. They are compared with the average daily maximum allowable concentrations.



4.5 Chart. The average monthly concentration of nitrogen dioxide (NO2) in Agmashenebeli Avenue in 2008-2010. They are compared with the average daily maximum allowable concentrations.



4.6 Chart. The average monthly concentration of lead (Pb) in Agmashenebeli Avenue in 2008-2010. They are compared with the average daily maximum allowable concentrations



The following can be concluded based on the available data on the ambient air quality in Tbilisi:

- the concentrations of CO, SO2, NO2 and particulate matter in Agmashenebeli Avenue which has heavy traffic and is located in the center of Tbilisi exceeds the national standards in 2004-2010. The lead concentration has decreased since 2008. and is now slightly lower than the national standard. Low-level ozone measurements started in 2010. These measurements are carried out only in Agmashenebeli Avenue and according to the National Environmental Agency the concentration of this pollutant is within the limits of the maximum allowable concentration (MAC).
- The data of 2010 showed that CO and NO2 concentrations in Tsereteli Avenue, where the trafiic is heavy, exceeded the national standards.

In 2010 CO concentration was within the limits of the national standards in Moscow Avenue, which is quite far from the city center. However, NO2 concentration in this area exceeded the national standard.

Project study data

Within the limits of the presented EIA, the air sample analysis on 4 project sites was made by

the Environmental Agency. The objective of the air pollution analysis is to give an approximate evaluation of the existing situation on a particular project site, which can be used to forecast the data of the project impact analysis and traffic pollution. Below, we give a short abstract.

Table 4.2 Results of measuring the polluting substances in the atmospheric air. Compared with the instant (single-shot) maximum sadmissible concentrations (MAC)

#	Site of measurement	t^0	Humidity %	Concentration mg/m^3			
				Dust	CO	CO_2	SO_2
#1	Rustavi Highway(13,5km)	3.2	30	0.072	0.98	0.046	<0.1
#2	Rustavi Highway (17,7km) Rustavi entrance	3.6	34	0.104	0.66	0.082	<0.1
MAC				0.5	5.0	0.2	0.5

As the Table shows, the indicators of background emissions along the project road are within the established norms.

4.1.3 Background noise

Existing information about the background noise in Tbilisi

In March of 2004, the Institute of Geophysics of the Academy of Sciences of Georgia accomplished test studies in the residential areas at night and by day, in particular at 8 sites in Digomi massif in windless weather. The same group made similar measurements at 10 points of Old Tbilisi in December of 2005. The averaged noise does not exceed the parameters established for the residential areas. [1] In particular, the maximum permissible level is 55 dB 2 m from the residential houses by day and it is 45 dB at night. It is established that noise in the central streets and mains of Tbilisi exceeds the admissible level in rush hours (See Table 4.3) and reaches 78 dB on some sites of major road mains and streets, while the maximum permissible level from 7 pm to 11 pm is 65 dB and from 11 pm to 7 am it is 55 dB along the central road mains. The highest indicator of 78-80 dB is fixed in Varaziskhevi.

Table 4.18. Background noise in some districts of Tbilisi

Measurement site	Noise level, dB	In excess of the admissible norm, dB
Rustaveli Avenue 15	76	11
Left bank of the river Mtkvari	76	11
Varaziskhevi	80	15
Melikishvili street	76	11

Source: Institute of Environmental Protection, 2002

The difference between the data is clear if considering that the main source of noise in Tbilisi is traffic.

Table 4.19 Admissible noise levels in Georgia for the areas in the immediate vicinity of the residential houses

Time	Admissible equivalent (averaged) noise, dB	Maximum admissible noise levels, dB
7.00 – 23.00	55 (65*)	70 (80*)
23.00 – 7.00	45 (55*)	60 (70*)

*Note. The equivalent and maximum sound levels (dB) for eth noise originating in the area due to the car and railway traffic, distanced from the construction isolating the first echelon of sound-protected residential houses, hotels, hostels by 2 m, directed towards the common city and regional mains and railway, is admitted to be 10 dB more (precision = +10 dB; see values in brackets) than the basic admissible value.

Project study data

The background noise was measured along the most densely populated area (km17.8 – the end point) and at the proposed camp site (km 13) at 13:00 pm on December 15, 2011. The existing background noise was measured with a device “PCE-EM882”. For half an hour, the readings were measured in every 5 minutes (total of 6 readings) and the average indicator was calculated for every noise point. The average noise level amounted to 65 dB for km13 and 58 dB for km 17.8. The maximum noise level was 78 dB at km 13 and 73 at km 17.8. Thus, the fixed noise level is within the established norms, but is close to the limit.

4.1.4 Background radiation

Existing data

According to the data of 2009 of the Monitoring and Forecasting Center of the Ministry of Environmental Protection and Natural Resources of Georgia, the background radiation level for Tbilisi (exposition strength of γ-radiation in the near-ground atmospheric air) was 14.4 mR/hr.

Project study data

The radiation background was screened along the whole selected route of the mains section. Measurements were made on December 15, 2011 with a standard Russian device СРП 6801. The measurements were made during traveling by car all along the road and most densely populated stationery area (starting point of Ortachala 0.00 km). The radiation background levels varied between 6 to 8 mR/hr at different place.

4.1.5 Information about the surface watercourses and ground pollution

Existing information about the surface water quality

Exposure-spreading of surface waters and their impact on separate elements along the project territory is diverse and different. The impact of surface waters is maximal at the initial point of the road – pk. 126 and minimal on the other part.

Rustavi is divided into two sections by the river Mtkvari which is 4 km long, and it has no lakes or ponds. Resources for technical water on the territory (reference to the Mtkvari) are sufficient, but there is no additional resource for potable water. It is necessary to restore technical water supply in Rustavi, which will significantly decrease the consumption of potable water and increase its long-term supply to the households. Water of the river Mtkvari used to be utilized as the source of technical water, but the old infrastructure is damaged and cannot be restored. According to Rustavtskali Ltd. (Rustavi Water) there are several projects for restoring technical water supply to the city, however, due to lack of funding they cannot be implemented at the moment. The reservoirs (catchments) of potable water, holding a total volume of 30,000 m^3 on the river Khrami in Gardabani Municipality belong to Rustavi.

It should be noted that the old main water catchment channel is located along the first section of the projected area. Reconstruction of this water catchment channel is carrying out in parallel of modernization project of highway. It is located between highway and local road. From the south-west eight drainage channels and on km.125+50 “Tskalta meurneoba” channel connect to the main water channel. Surface water collected from all of the water ways flows to the direction of river Mtkvari under the bridge located between pk. 125 and pk 126. Totally the local road will cross 9 water ways.

On the second part of local road the old and destroyed irrigation dry channels or other natural and small ravines are located. In the middle of the road section on the left side after connection with Tbilisi bypass (between pk 153+00 and pk 155+00) waist waters flowing from upside of the slope are accumulated. These waters form thin pools that on the limited areas are covered by the hydrophilic Arundo that is caused by unsteady swamping.

The last part of the road is free from the surface waters. Periodically small amount of water accumulates only during the precipitation in bays between the fills and slope.

4.1.6 Topography and relief

Tbilisi is located in South Caucasus at 41^{o}43' North latitude and 44^{o}47' East longitude. The capital of the country is situated on the both banks of the river Mtkvari, at 380-770 m altitude above sea level. It has an amphitheatre shape and is bordered with mountains from its three sides. Tbilisi is bordered by Saguramo Ridge from the north, by Iori Plateau from the east and south-east and by the branches of Trialeti Ridge from the south and west (See Fig. 4.5). The city is stretched along 33 km along the river Mtkvari and covers the area of 372 km2.

Fig 4.2: Kvemo Kartli Topo Map

The river divides the capital into two. The left part of Tbilisi exceeds its right part with its area and population. The portion of the city on the left bank of the river Mtkvari is stretched from Avchala district to the river Lochini, and the relief of its right bank is presented by the branches of Trialeti Ridge descending as escarps towards the Mtkvari gorge. Therefore, the major obstacles for the city to extend on the right bank of the river are mountains. Within such geographic environment, there are highly densely populated sections, while other areas of the city due to their complex topographic relief, are not developed. The south-eastern part of the city is located at 350 m above sea level and the settled areas of Mtatsminda are located at 550- 600 m above sea level.

The relief of Tbilisi is complex and its diversity is the result of its geomorphological structure. The relief had been subject to a strong transformation for centuries. Out of the natural-tectonic phenomena, the landslides, mudflows, erosion and floods are active. Landslide and gravitational phenomena are the main factors hampering the development of Tbilisi and damaging the city infrastructure.

4.1.7 Geological conditions of the study area

History of geological studies

The study area, if compared to other regions of Georgia, is better studied in a geological respect. The first geological studies here were accomplished at the end of the XIX century by G. Abych (1869, 1887, 1902) and E. Furnie (1896) and others. The mentioned authors developed the geological basis of the study area what largely facilitated further geological works by the explorers. The second stage of studies started in the 1930s headed by V. Rengaten (1937), S. Kuznetsov (1937), N. Vasoevitch (1932, 1937), A. Janelidze (1930), whose works laid the foundation to the extension of the geological net. The most important studies were accomplished in the 1950-70s by D. Buleishvili (1960), I. Buachidze (1949), I. Kakhadze (1947), N. Skhirtladze (1958), N. Aslamazova (1953), D. Papava (1971), E. Devdariani (1971) and others.

The first significant hydrogeological studies in the study area were accomplished by I. Buachidze (1949), continued by the studies of L. Kharatishvili in subsequent years (1970, 1980). The most important studies in the engineering-geological respect, covering the whole of the study area in particular were accomplished by A. Tsagurishvili (1981). These studies were accomplished with the scale of 1:25 000 from Tbilisi to the state border of Georgia, within the limits of the river Mtkvari gorge. The geomorphological studies in the study area were accomplished by different authors, with the works by L. Maruashvili, D. Tsereteli and N. Astrakhov (1971) being the most important though. In fact, these authors succeeded in studying the relief and morphological conditions of the area in details.

The geology and tectonics of the study area

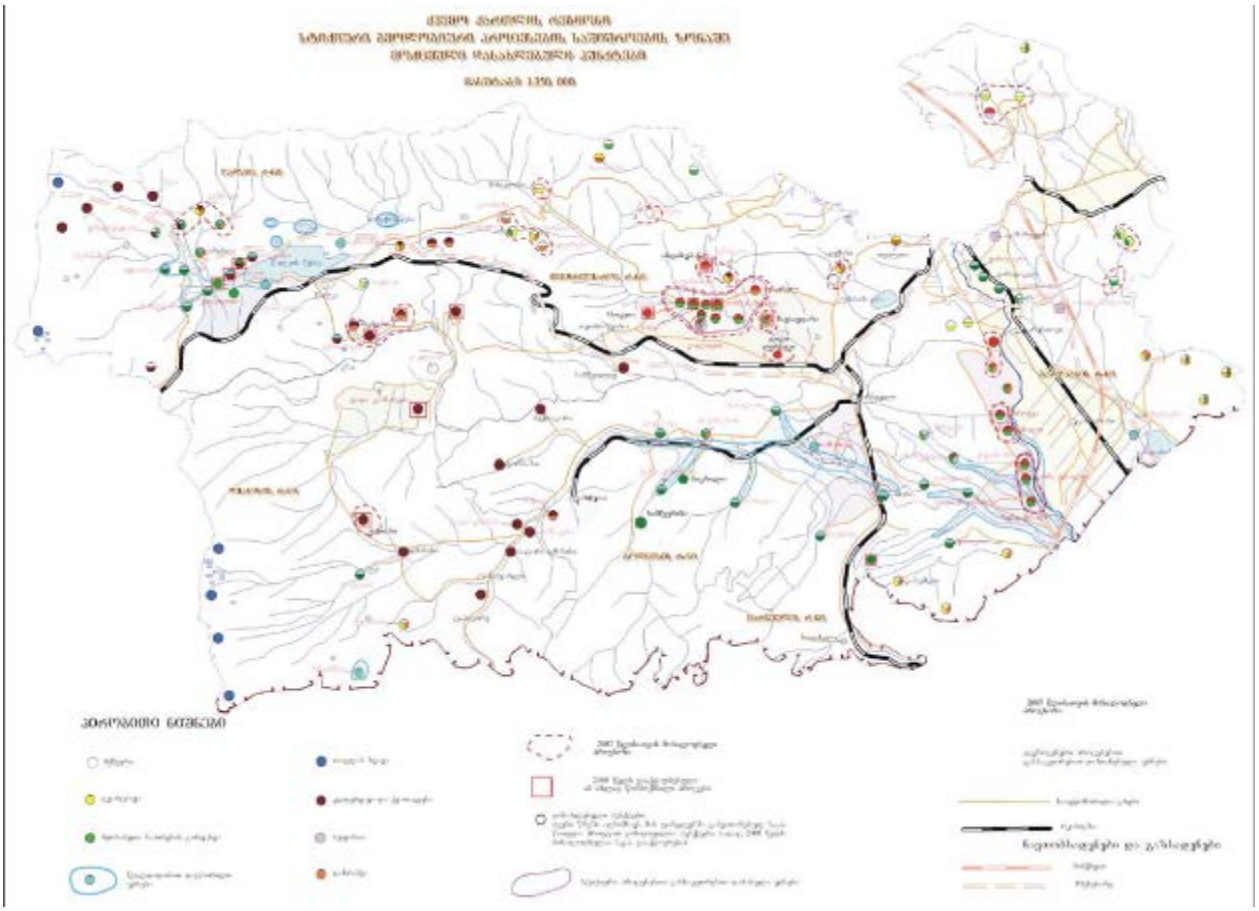
According to the tectonic zoning of Georgia (E. Gamkrelidze, 2000), the study area is included in the southern and Bolnisi sub-zones of the folded system of the Lesser Caucasioni. The geology of the area is participated by the rocks from the Middle Eocene through the Quaternary periods.

The deposits of volcanogenic-depository formation of the Middle Eocene are spread in the North-Western part of the study area. The area of spreading of these deposits coincides with that of Teleti anticline and they are represented by layered tufas and tufa-breccias. The stratum is characterized by facial modifications, which are strongly dislocated.

The deposits of the Upper Eocene are spread in the north-western part of the study area. Lithologically, the Upper Eocene is divided into two strata: the lower Navtlughi stratum and the upper Tbilisi stratum with nummulites. Only the former stratum is spread over the study area. It is mainly represented by marls, argillite-like clays with sandstone and tufa-sandstone interlayers. The total thickness of Navtlughi stratum in the environs of Teleti ridge varies from 150 to 260 m.

The Oligocene (Khadum horizon) deposits are spread in the central part of the study area, which are mostly represented by clays with gypsum and rarely with sandstones. The thicknesses of Khadum horizon clays reach 50-70 m.

Fig 4.3: Kvemo Kartli Map near urban areas



The Lower Miocene deposits, which are spread in the southern part of the study area, is presented by two lithological strata: the lower sandstone stratum belongs to Sakaraulo horizon, and the upper stratum, which is almost totally structured with Maykop habitus clays, belongs to Kotsakhuri horizon. Sakaraulo deposits almost horizontally lie over the deposits of the Oligocene age. The horizon is structured with strong sandstones with quartz-arkose content with clay and micro-conglomerates interlayers. The sandstones are of a typical whitish color. The total strength of the horizon reaches 600 m. The deposits of Kotsakhuri Age are presented by non-carbonate thin-layer dark clays, which reach 600 m when weathered. The dark clays of Kotsakhuri Age disintegrate into thin brown slates during weathering. At some places, there are broken sandstones and sand interlayers spread in the given clays. The average strength of the horizon is 600 m.

The deposits described above over the study area are covered with the Quaternary deposits of different thicknesses almost everywhere, which on their turn are presented by the I and II right over-floodplain terraces of the river Mtkvari of alluvial genesis and deposits of deluvial-proluvial genesis. The deposits of alluvial genesis in the study area are spread most of all and are presented by marly, well-treated shingle with the admixture of boulders (5%) and sand-gravel filler (15-20%). The thickness of the mentioned deposits within the limits of the study area reaches 10-15 m.

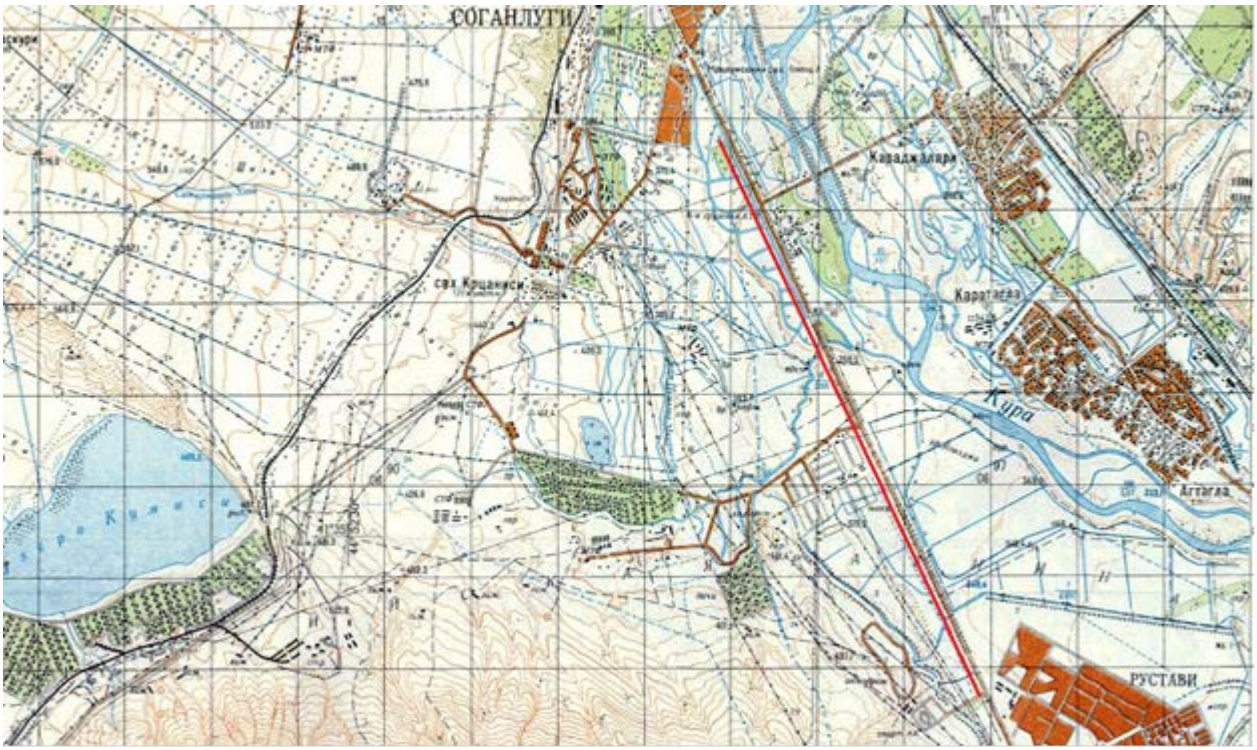
Deluvial-proluvial deposits in the study area are mostly spread in its northern part and are presented by clay ground (clay and loam) with the admixtures of detritus and grit (20-25%).

Their thicknesses, if considered visually, vary between 3 and 5 m. The greatest tectonic unit in the study area is the eastern end of Bedena-Teleti anticline, which on its part is divided into Teleti and Tabori anticlines. On their part, these anticlines are divided by Krtsanisi and Tsalaskuri synclines.

The total length of Tbilisi-Rustavi rehabilitation road is 17,1 km and is divided on three sections: I – Tbilisi-Phonichala with length – 4,0 km; II – Phonichala section, length – 6,5 and III – Phonichala-Rustavi, length - 6,6 km. The local road will be constructed along all these sections.

Presented document includes the results of geo-technical surveys carried out for local road along section III (Phonichala-rustavi).

Fig 4.5: Overview surveyed section



Designed Tbilisi-Ponichala road section is entirely located in Gardabani region. It starts near head office of constructing highway, east to the Phonichala settlement (pk 105+00) and ends near the second entrance of Rustavi city. The local road pass along constructing highway from the right side at a distance 10-15 m. Thus the length of study area is 6, 6 km and width – 30-50 m.

The surveyed rout on Phonichala-Rustavi section crosses several small waterways, sparsely settled village, main oil and gas pipelines.

For assessment of geo-technical conditions the total length of the area and nearby territories were studied using the geological route method. For research of geological cuts and for determination of soil characteristic, natural and artificial denudations and trenches and channels slopes were used. Special attention was paid to the development of modern geodynamical processes along the route, assessment of slope sustainability and clarification of whole

geodynamical conditions. Besides of field works carried out on 2014, in the research is used the geological data of highway modernization project and the data of researches carried out on 2009 by our team for Tbilisi-Red Bridge road.

Presented geo-technical conclusion is based on abovementioned data and results received from geological, geo-technical and hydrogeological studies of routes researched by other different geological and project organizations, also the hydrometeorological reference books.

Geotechnical field works were carried out and conclusion is prepared by Terms of Reference prepared by client and according to the normative documents currently operating in Georgia according recommendations and requrements of s.n. and year 1.02.07-87 (Engineering research for construction), s.n. and year 1.-pn 02.01.08, 2. 2.02.01-83 (Artificial constructions foundation), pn 01.01-09 _ `Seismomedegi Construction~, pn 01.05-08 _ `Construction climate ~; and Georgian standard ("Saxstandarti") 25100-82.

Geo-technical field surveys, office works and conclusion were carried out on August, 2014.

Geo-technical assessment of the road

Geo-technical condition of study road is almost the same. The road is divided in three sections:

1. The first part is located between pk 105+00 and pk 126+00. The road crosses accumulation I terrace above the floodplain of river Mtkvari, which is splitted by the number of channels. Terrace is built by the watering shingle with sand filler. The Argillites of lower Pliocene (basic rocks) are located under this layer. The firs one is belongs to the loose soils and another to the non-rocky soils. The characteristic of both soils corresponds with road construction conditions. The modern geodynamical processes are not spread on this area. The section is characterized with high level of sustainability.
2. The second part covers connecting slopes of I and II terraces between pk126+00 and pk128+00. Relief is erosive. On the edge of two terraces the water catchment channel along the road from the south "Tskalta meurneoba" channel and the dry ravine flowing from Iagluja slope are connected to the area. The arrangement of the road and viaducts with infrastructure is planned on high fill. the bases of this infrastructure will be argillites of lower Pliocene and weathering crust clays. on the slope the deformations including gravitation character were not detected. The slopes are sustain. The section belongs to the II (average) difficulty category.
3. The second part covers the section between pk 128+00 and pk 171+00. The road crosses weakly splitted slightly waved II terrace over the floodplain. The surface layer is constructed by the delluvial-prolluvium clays. Under this layer is located alluvial shingle watering on 6, 5-11 m and substrate is basic rocks – Argillites of lower Pliocene. It should be noted the aggressive action of underground waters towards the concrete. The first type of soils belongs to the combined soils, another – to the loose and third to the non-rocky soils. All three types of soils corresponds with the road construction conditions. The modern geodynamic process are not spread on this area. The section is characterized with high sustainability.

According to the geo-technical difficulty the section belongs to the category I (easy).

4.1.8 Assessment of the Design Corridor Engineering-Geological Conditions by pickets (kilometers)

Averaged physical-mechanical (geotechnical) properties of the grounds structuring the study area

Geomorphology

From the geomorphological point of view researched local road is entirely located on the territory of Kvemo Kartli lowland. It crosses the right side terraces of river Mtkvari. Along the whole length the relief is accumulative with spreading of sharply presented typical forms. The road crosses young (modern Holocene) low and old tall (upper Pleistocene) terraces of river Mtkvari.

Hypsometrically on the lowest part – pk 105+00-pk 126+00 the road cross the youngest (Holocene) and low I terrace of river Mtkvari. Its surface is straight and almost flat, with weak inclination to the south-east direction (direction of river Mtkvri flow). The absolute points are between 347-354 m. with continuous decrease to the direction city Rustavi. Lithologically it is built from the water-logged gravel, sands and sands fillers. The surface of terrace is splitted by the number of water ways with 0,5-2,0 deep.

From pk 128+00 to the end of section the road latitudinal crosses the high (upper Pleistocene) second terrace of river Mtkvari. Absolute height is from 355 to the 361 m and is 12-15 m higher than the first terrace. The surface of the terrace is straight slightly wavy with slight inclination to the south-east. At the beginning of the road the absolute points slightly increases from 259 to the 361 m, than for short distance is kept and after starts decreasing. Near Rustavi fair and first entrance of city the absolute point is 351m and at the end of the road – 354m. The surface of the route is slightly splitted with small cut-hollows and old channel (Tskalta Meurneoba) fragments. Terrace is built by the turns of clays and gravels.

The original relief along the local road is totally changed by anthropogenic factor. Almost continuously the new surfaces are created or old ones are changed, that is connected with construction of new roads, irrigation systems or agricultural works on the territory. Along the road the typical anthropogenic forms are created – a lots of fills with truncated cone cross-sections, melioration and irrigation channels, hollows, pipelines and knots of industrial enterprises. The other part is used for agricultural purposes (pastures, arable lads), and the less part is used for old half destroyed enterprises and homesteads. During last two decades near city Rustavi at the last part of the road the large areas were used for arrangement of auto market and its infrastructure.

Thus, along the whole length of the projected road high level of techno pressing is presented.

Geological composition

The projected area is included in the Eastern part of south sub-zone of Ajara-Trialeti zone (Lesser Caucasus folded system), where the total folded system is dipping. The largest tectonic unit of sub-zone is meridional Teleti anticline fold which is presented by the sedimentary and volcanogenic deposits. The researched area totally covers south part of anticline.

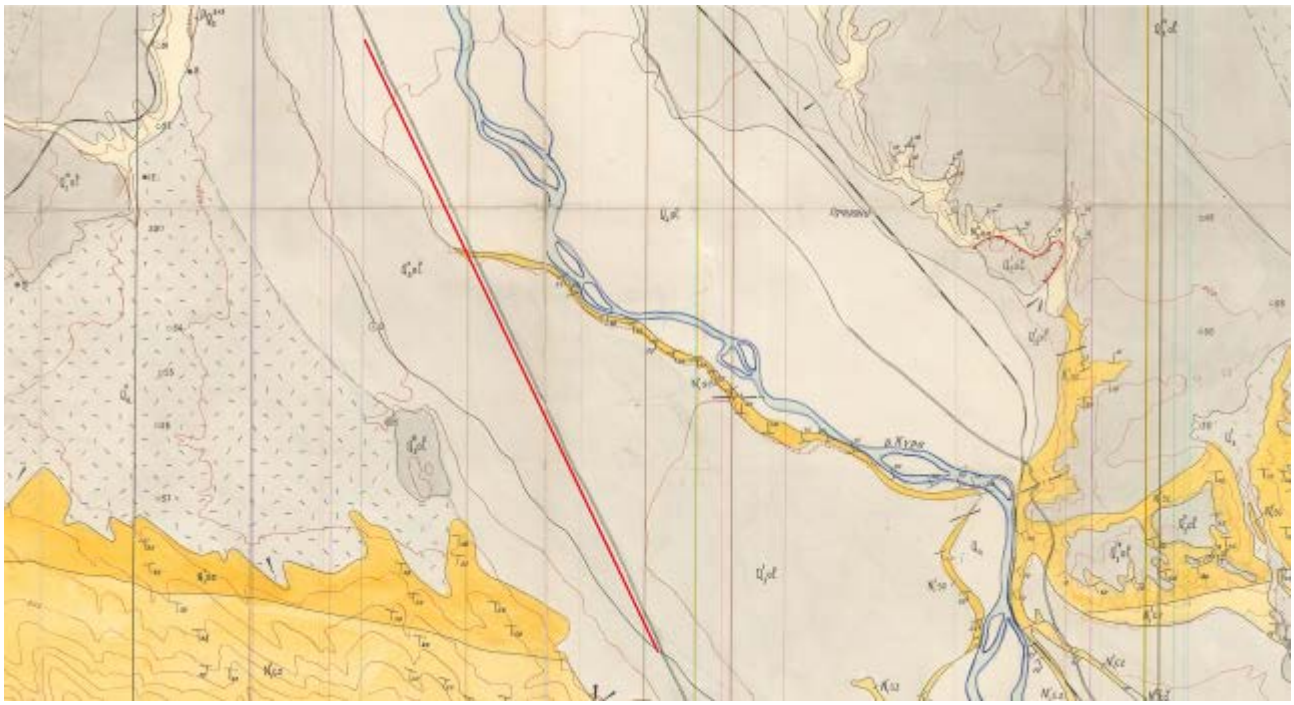
The substrate of the total length of the road is built from dark gray argillites and thin aleurite layers of Sakaraulo horizon disposed under strong alluvial sediments aged Miocene **(N_1^1sc).** Their manifestation on surface was not detected because it is covered by the alluvial deposits

along the whole route. Exception is the connection slope of river Mtkvari between pk 126+00 and pk 128+00 which is built from the weathering crust of these deposits.

The initial part of studied area between pk 105+00 and pk126+00 pass the first terrace of above the floodplain terrace. It is built from the modern alluvial **(aQ_{IV})** deposits with well-treated gravel, sand and sandy fillers. The capacity of modern alluvial deposits is 8-10 m and is water-logged from 2 or 5 meter.

Hypsometrically upside, till the city Rustavi between pk126+00 and pk 171+00 the road crosses the second terrace aged upper Pleistocene **(aQ_{III})** with slight slope to the east. Near the edge of terrace, on the surface under the 3-5 m capacity clay layer is disposed well-treated gravel with boulder and sand fillers. Along the base of the step these sediments are water-logged. The total capacity of these lithological varieties is 10-15 m.

Fig 4.6 Geological map (D. Papava, E. Devdariani and v. Ageev – 1971y)



legend:

$aQ_{IV}^{I}Q_4$	modern alluvial gravel sand and sand fillers (I terrace);
alQ_3^{II}	upper quaternary gravel with sand filler, clay and loams (II terrace)
N_1^1sc	lower Pliocene “Sakaraulo horizon”. Argillites with thin Aurilite layers.

Researched road

Hydro-geological Conditions

According to the Hydrogeological zoning of Georgia the study area is located in the region of Marneuli-Gardabani artesian basin.

According to the geological composition and index of water existence, water-bearing horizons and water prove layers identified within the study area are as follows:

- Floodplain water-bearing horizon with modern alluvial deposits **(aQ_{IV});**
- Early quaternary water-bearing horizon with alluvial deposits **(aQ_{III});**
- Water prove deposits of low Pliocene **(N_1^1);**

Along the designed road the main rocks are waterless or are poor with underground waters. The cover built with Delluvial-Prolluvian rough clay deposits also is waterless. In deposits of southern slope of the ridge on 8-10 m depth seasonal porous streams are formed in clay-gravel deposits. The possibility of interaction between these streams and road communications is minimal.

Water-bearing horizon of floodplain built from the modern alluvial deposits **(aQ_{IV})** is developed within the river Mtkvari I terrace above the floodplain. Alluvion is presented by the well-treated shingle, gravel and sand filler with capacity of 10 m. The substrate of horizon is presented by the Terrigenius deposits of lower Miocene. The water content is directly depends on granulometric composition, filtration ratio is 150-300 m/day. The depth of underground waters is 2, 7-5, 3 m with level fluctuation of 1, 0-1, 5. According to the chemical composition the underground waters are belongs to the hydrocarbon calcium type with general mineralization of 0, 3-0, 5 g/l. Horizon is supplied mostly by river water, atmosphere precipitation and overflows from other horizons. The regime of horizon depends on hydrological regime of river.

Early quaternary water-bearing horizon with alluvial deposits **(aQ_{III})** is spread on the right side of river Mtkvari from Phonichala to Rustavi. It is presented by boulder-shingle, slightly coherent conglomerates, loams and gravel layers. The depth of underground waters is 5-8 m with insignificant fluctuation of levels. The waters chemical composition is hydrocarbon-sulphate calcium, which on separate districts transform to the sulphate-hydrocarbon magnesium type, accordingly the mineralization increases from 1 g/l to 10 g/l. In separate cases on the border of low terraces frontal wedging-out of their flows is occurred in a form of scattered springs and seepage waters.

Water prove deposits of low Pliocene **(N_1^1) –** is spread from Phonichala to south-east of Rustavi and almost the whole territory is covered by the alluvial deposits. Its local narrow exposure on surface is fixed only near the connecting slope of I and II terraces. Lithologically is presented by the thin layers of argillites, carbon and Maikop type clays with rare layers of sandstones. The rocks mostly are water prove. The thin underground waters with seasonally changeable character are formed only within the weathering zone on 5-8 m depth. Descending and small capacity springs on the surface are rare. According to the circulation the waters are porous and according to the chemical content –hydrocarbon-sulphate calcium, sulphate or chloride sodium with general mineralization of 0, 3-5, - gr/l. Due to the soil low filtration unloading has find difficulties, it occur by evaporation process. Within the whole aeration zone collection of salts is connected to the evaporation process. The waters with high mineralization are very aggressive towards concrete. The nourishment of horizon is carried out from atmosphere precipitation and overflow from above located water-bearing horizons.

Special part

For assessment of modern geo-technical conditions and for usage of territory for construction is necessary to determine hazardous geo-dynamical processes, also qualitative and quantitative characteristics of rocks and forecasting of their changes. As a result of studies it was determined that geo-technical conditions of route is mostly similar as the other natural conditions but still are some differences.

Modern geodynamical and other processes

Formation and development of hazardous geo-dynamical processes or their large scale display on the study area is not detected. The territory along the road is characterized with high level of sustainability, which will be preserved in future.

On the south slope of Iagluja ridge is possibility of developing of mudflow, which may endanger the last section of the projected road. Currently in dry ravines and water catchment channels is lack of weathering and dispersed friable material. During the rainy season in waterways only the turbid flows are formed with small amount of mud which deposits and does not reach to the road.

It should be noted that on the existing fill the visible or hidden surface gravitation deformations are not detected.

Swamping and wetlands mostly are met on the territory of I terrace above the floodplain of river Mtkvari and it can be problematic for the first part of the road. Watering of terrace deposits is caused by the underground waters overflow from the upper terrace deposits and infiltrative waters from river Mtkvari. Existence of water tables and ponds is caused by the seasonal raising of levels. Similar but less intensive problem is on the right side of the road from the overpass of Tbilisi to Ruatavi. Modernization of Highway will solve these problems.

Conclusions and recommendations

1. Researched local road is located on the right side of third part of Tbilisi-Rustavi modernization highway between pk105+00 and pk 171+00 with total length – 6,6 km.
2. It covers the straight or slightly waved surfaces of I and II terraces over the floodplain. Elevation between terraces is 12-15 m.
3. Road section is constructed by Argillites with Aleurolites interlayers aged lower Pliocene. Between pk105+00 and 126+00 abovementioned rocks are covered by modern alluvial sediments and between pk126+00 and 17+00 upper Pleistocene Alluvial sediments. On both cases shingle with sand fillers are presented.
4. The construction rocks of both terraces are hydrated. The first terrace is affluent , water level is 2,7-5,3 m. The second terrace is waterless they are located on 6, 5-11m and characterized with sulphate aggression towards the concrete. They cover water prove Pliocene Argilites.
5. By the combination of field studies and office works on the site was determined three layers – combined, uncombined – friable and non-rocky layers that correspond to the engineering elements. All of these layers satisfy road construction requirements.
6. Within and nearby the projected section, modern geodynamic processes were not detected. Subsidence, collapse of soils and other events on naturally high sustainability

surface does not detected. On separate districts seasonal swamping processes and wetlands are spread, which can be corrected by the regulation of surface waters taking into account the micro-relief conditions.

7. The Section of the road is sustainable along the whole length and will keep such condition in future.
8. According to the seismic zoning of Georgia `seismomedegi mSenebloba~ (pn 01.01-09) the projected section is located in 8 point zone with maximal horizontal acceleration of 0, 17 in Tbilisi and 0, 12 in Rustavi.
9. According to the processing difficulty shingle and clay-loam soils belongs to category III and argillites to the category V.

4.1.9 Water Resources

The riverhead of Mtkvari is in Turkey, on the North-East slope of Kyzyl-Ghaydyk Mountains at 2700 meters altitude. The length of the river is 1,364km and the area of the basin is 188,000 km^2. The length of the river on the territory of Georgia is 360 km. Basin area on Georgian territory is 26,000 km^2. The river is fed by snowmelt, rain and ground waters. The highest level of water is in spring, with about 53% of yearly discharge. Summer discharge makes 25% of yearly discharge. Low is the indicator in autumn and winter, when the seasonal discharge amounts to 12 and 10% of yearly discharge accordingly.

Sediment transport is connected with river discharge. Maximum daily average load varies between from 470kg/sec to 32,000kg/sec at different monitoring stations. Water turbidity is also important; its registered level varies from 2,700 g/m^3 to 12,000 g/m^3 at different monitoring stations.

The Mtkvari river is fed chiefly by snow (36 percent) and ground water (30 percent); it is also fed by rain (about 20 percent) and glaciers (14 percent)..

Mainly springs and groundwater are used for agricultural purposes in the villages. The river Mtkvari is widely used for irrigation, power engineering and industrial water-supply purposes. The head works arranged past the city of Rustavi supplies the irrigation and power engineering water to Gardabani irrigation system and Gardabani thermal power plant. r. Mtkvari is not used for navigation. Fishing in r. Mtkvari has no economic value but mostly a leisure meaning river is used by the fauna species and by livestock to some extent. There are a number of alluvial water wells for irrigation purpose located close to Phonichala. Therefore, there is no significant use of river water by the locals living in the area for drinking, irrigation or production purposes.

4.2 Ecological Resources – Landscape and Flora

4.2.1 Landscape and Soils

Evaluation of adverse impacts on soil and soil pollution was performed according to the Georgian laws and regulations (the law applicable to the largest extent is the Law on the Soil Protection, 1994 (amended in 1997 and 2002).

The road section from Phonichala – Rustavi section of the highway lies on the Kvemo Kartli Plain. Influenced by both, geologic and anthropogenic changes, the plain predominantly consists of arable land with little natural vegetation. The soils in this region are relatively fertile. Most of the land is subdivided into small plots, which are primarily individually-owned and occupied by orchards, vegetable gardens, corn fields, hay and some overgrown secondary meadows.

The sample analysis revealed that concentration of all metals is below relevant maximum allowable concentrations adopted in the EU.

Landscapes of Fonichala are diverse. Many regions of specific landscape border each other in the surroundings of Fonichala. Due to these particular components of landscapes and the whole landscape itself are so diverse. Plain and hilly part of Fonichala environs developed the landscape typical for the grassland of Eastern Georgia, while the landscape of Western and Northern part is mainly woody and mountainous, creating altitude zones. Due to human impact original natural landscapes have been significantly modified on the territory of Fonichala. Relatively untouched landscapes still remain in the zone of mountain-forests and, partially, in the areas unsuitable for rural development. In all remaining parts of the city there are modified, secondary natural or cultural landscapes.

Due to diversity of natural conditions and relief the soil of Rustavi and its surroundings are of various types. There are grey-brown, meadow grey-brown, humus-sulphatic, alluvial, saline, alkali, forest brown and black soils. Due to them a wide area is occupied by thin washed down soils with different types of bear land rocks. In the gardens and parks of Fonichala there are soils cultivated to different degree. This soil has lost its natural shape and now represents a cultural variation of the original soil.

Soil Characteristic

Besides of similar natural-landscape and geological composition of study road, the construction soil lithology, hydrological conditions and their characteristic is different.

At the initial section between pk 105+00 and pk 126+00 the road bad should be based on modern alluvial deposits of terrace I of river Mtkvari which has composition presented below:

1. 0-0,5 m – loams with shingle admixtures;
2. 0,5-8,0 (10,0)m – well-treated shingle with sand fillers, watering from 2,7-5,3 m;
3. >8 (10,0)m – Argillites with aleurolites;

At the end of the road approximately between pk 121+00 and pk 126+00 in the upper part of the section is presented #4 layer with 2,0-30 m capacity loam soils.

layer #1 – brownish and brownish-gray loams covered by the topsoil with admixtures of thin and average size well-treated shingles from 5-10 to 30%, slightly humid, hard, with density – 1,7-1,8 gr/sm^3, estimate resistance is 2 kg^{force}/cm^2;

Layer #2 – average size well-treated shingle with large size shingle admixtures, petrographical composition is – sedimentary and magmatic-volcanogenic dense rocks, gray colored with sand conglomerate fillers. Water-bearing, density 2, 0 gr/sm^3, estimate resistance is 5-6 kg^{force}/cm^2;

Layer #3 - Argillites with thin aleurolites interlayers, dark gray, dense, thin layered –striped, with interlayers of aleurolites, water prove. Density 2, 2 gr/sm^3, estimate resistance is 3-4 kg^{force}/cm^2;

Layer #4 – brownish-gray loams, well-treated shingle admixtures, humid and increased humid, hard and soft-plastic, density 1,6-1,7 gr/sm^3, estimate resistance is 1,5-1,8 kg^{force}/cm^2.

The road on pk 126+00 and 128+00 will pass on high artificial fill under which is located Pliocene age weathering zone clays.

Between pk 18+00 and 171+00 the roadway will based on Pleistocene alluvial deposits of II terrace of river Mtkvari, which is covered by the delluvial-proluvial clays and composition of its cut is presented below:

1. 0-5,0 (8,0)m – clay with rare admixtures of shingle;
2. 5,0 (8,0)-8,0 (12)m – well-treated shingle with sand fillers, watering from 6,5-11 m;
3. >8,0 (12) m – argillites with aleurolites interlayers.

Layer #1 (5) – dark brownish-yellow clay with admixtures of shingles, slightly humid, hard. Density 1, 8-1, 9 gr/cm^2, estimate resistance is 2-3 kg^{force}/cm^2;

The characteristic of shingles and argillites is the same.

4.2.2 Vegetation

The report comprises the results of the review of literature and scientific research, which aimed at the study of the flora and vegetation within the corridor of the project of Tbilisi-Rustavi section of the Tbilisi-Tsiteli Khidi (Red Bridge – border with Azerbaijan) road and more specifically – the discovery of sensitive habitats and communities within the section.

Botanical description of the zone of interest is based upon the literature sources and field research as well as our own experience and knowledge. It should also be noted that research with the aim to obtain more detailed information enabled to fill in the existing gaps and obtaining detailed data on design and construction. Such data is necessary for environmental assessment in botanical terms. Consequently, as a result of the above mentioned researches the expected negative and residue impact on the flora and vegetation of the areas adjacent to the corridor have been revealed.

Communities and species (included in Georgian Red List, Red Book, endemic, rare) of various conservation value occur in the project impact zone as well as plants of economic value (medicinal, odorous, wild fruit, fiber, tubers, decorative, drinking, raw material and firewood forests, forage, hay meadow-pasture, wild predecessors of crops, etc.).

Along with endangered species and sensitive habitats with various conservation values forests are especially notable; if residual impact is determined on the forests, eco-compensation measures should be implemented, which comprises the restoration of equivalent forest habitat.

The object of research was to execute botanical study on the territory of city Rustavi and Gardabani municipalities along the river Mtkvari. The length of area is 6.6 km. The task of study includes investigation of flora and fauna, inventory of plants, determination of rare and relict plants, assessment of background condition along the project area, also assessment of impact of natural gas pipeline during its exploitation and preparation of preventive activities during construction and after construction period.

Description of research territory

General geographical characteristic: project area covers city Rustavi and territory of Gardabani municipality (Kvemo Kartli region). Corridor length is 6, 6 km and it is located from the north-west to the south-east direction. The territory is situated on Kvemo Kartli lowland and it has plain relief.

The hypsometric amplitude is not high due to plain character (350-361 m above sea level). The lack of height amplitude causes similarity of vegetation. From the geo-botanical point of view the research territory belongs to the east Georgian geo-botanical area, Iberia lowland region, Kvemo Kartli lowland geo-botanical district.

It should be noted that research area is totally transformed by anthropogenic factor and it is characterized with developed infrastructure. The first part of corridor crosses vegetable gardens and then it is surrounded with privet lands and buildings.

As it was mentioned above from the botanical point of view the research area is unvaried. The natural vegetation is presented with secondary redural and steppe vegetation; also along the

road we meet trees. The research area on several points is crossed by channels with swamp vegetation. Some area of second part of the area is covered by Artemisia sp. steppe.

Methodology

During research of territory the field route method was used. According to the route selected on ortho-photomap on the territory was carried out detailed botanical studies, vegetation list was created, photos of different habitats was taken. GIS was used. Materials collected during the field trip were combined with literary data.

Review of Research results

As it was mentioned above the area covers the central part of Kvemo Kartli lowland (Kvemo Kartli Region) and it is presented with lowland relief.

The Climate is uniform and belongs to the dry continental subtropical climate with average precipitation 350-400 mm.

Coordinates of initial zero-level point is X 493876 Y 4607722, height above sea level – 350m. The territory is situated along the soil road. Floral composition of this point is: *Medicago sativa*; *Xantium sp*; *Sorghum halepencse; Brassica campestris; Centaurea ssp; Erymgium coeryleum; Plantago minor*.

After 200 m from the initial point, the territorry is crossed by three chanells which is composed from swamp vegetation. From vegetation it should be noted: *Polygonum hydropiper; Typha latifolia; Sorghum halepencse; Phragmites communis; Iris pseudocorus; Carex sp*. Unit quantity

of *Epilobium hirsutum*, *Eupatorium cannabinum, Ramphicarpa medwedewii, Scirpus lacustris, S. tabernaemontani* and others.

After this line the corridor goes to the local road and through private lands. The vegetation is thin and monotonous, presented species are typical for rudimental and dry steppe: *Medicago sativa; Brassica campestris; Centaurea ssp; Erymgium coeryleum; Plantago minor; Consolida divaricate; Anthemis altissima; Polygonum verum* also cereal steppe vegetation - *Botriochloa ischaemum; Bromus japonicus* and other.

It should be noted that on the trace compactly populated timber vegetation are not met. they are presented only along the soil roads and the other infrastructure.

Table 1. Timber vegetation detected on research area

#	Latin Name of Species	Amount	Remarks
1	*Ulmus minor*	11	Red Listed – conservational, status VU
2	*Pinus nigra*	18	Artificial plantation
3	*Armeniaca vulgaris*	1	Artificial plantation
4	*Populus tremula*	1	Artificial plantation
5	*Sophora japonica*	5	Artificial plantation
6	*Elaeagnus angustifolia*	1	Artificial plantation
7	*Morus alba*	7	Artificial plantation
8	*Fraxinus sp*	13	Imported/decorative
9	Total	57	

Few exemplars of bushes are presented: Rubus caucasigena, Rosa canina, Paliurus spina cristii.

Despite of developed infrastructure the flora of second part of research area is diverse. Also plenty of privet lands that are covered with Artemisia lerchiana and dry steppe vegetation typical for degraded pastures are presented on this part of area. The first type vegetation composition is: *Botriochloa ischaemum; Festuca varia; Bromus japonicus; Lolium rigidum; Lepidium campeste; Hordeum leporinum; Vincetoxicum ssp*. After this section starts the *arable lands* where is the lack of vegetation and is only presented: *Glycyrrhiza glabra; Papaver hybridum; Cleistogenes bulgarica; Elytrigia pseudocaesia; Phleum phleoides; Achillea nobilis; Falcaria vulgaris; Galium verum; Medicago coerulea; Onobrychis ssp; Potentilla recta; Rumex tuberos; Erigeron annuus; Cirsium ssp; Polygonum heterophyllum; Anthemis altissima, Alchemilla filipendula; Tripeurospermum ssp.*

Artemisia lerchiana steppe in this case is monodominant formation which means that other vegetation is presented only unit exemplars: *Teucrium polium; Artemisia lerchiana; Botriochloa ischaemum; Petrosimonia brachiate; Salsola dendroides; Erodium cicutarium; Lolium rigidum*.

The last point of research area is located in Rustavi city – X496865 Y 4601694, 361 m height above sea level.

Conclusion

1. The project section is situated on lowland relief 350 – 361 m height above sea level and totally located on Kvemo Kartli lowland geo-botanical district of Iberia lowland region (east Georgian geo-botanical area). The most of the territory is covered by secondary vegetation. The vegetation is presented with steppes and agricultural lands.
2. From the species included in Georgian Red List 11 units of *Ulmus minor Mill* were determined; Each removed tree shall be compensated by planting and maintaining 3 trees (ratio 1:3) of the same species nearby or after completion of works and re-cultivation of temporarily used sites, except the species from the Red List of Georgia Ulmus *minor Mill* with ratio 1:10 (it means after one tree removal should be planted 10).
3. Endemic species were not determined;
4. On the research area were determined several species that have decorative and medical values - Thimus tiflisesnses, Plantago minor and other;

5. According to the results received from study of community and biocenose, on the area of local road construction, species and *cenosis* with high biodiversity value were not determined;
6. The most part of project area is located on the lowland and low sloped territories but due to the climate and soil specifications small local scale erosion processes may be occur;
7. Due to the characteristic of main species of local flora the natural regeneration process of this vegetation will not be disturbed during construction and operation, because this species are characterized with high index of natural regeneration. Also in this *xerophilous* and thin vegetation condition on some sections it is recommended to execute forestation (plantations, windbreaks);
8. For greening works it is recommended to plant: *Pyrus Celtis Caucasica, Pistacia mutica, Punica granatum*, along the channels - Elaeagnus angustifolia, *Ulmus, Tamarix*, and *Salix*. For more detailed consultations expert resolution of tree culture specialist is required.

4.2.3 Ecologically Sensitive Sites

Protected areas

The road project will not affect any of the protected areas. Gardabani reserve is located down the river Mtkvari flow.

After the completion of the detailed botanical survey of the designed project corridor the precise identification of sensitive areas and their detailed description has become possible. To sum up, the project area does not include any section of ecologically valuable and sensitive landscapes, habitats or ecosystems.

4.3 Ecological Receptors - Fauna

4.3.1 General description of fauna

In a zoo-geographic respect, the given territory may be attributed to the region of the river Mtkvari of Iran-Turan province of Mediterranean zoo-geographic sub-zone of Holarctic zone. The main landscape here, which is an accumulative plain, is covered with semi-steppe and steppe vegetation with Shybliak inclusions. There are animals here mostly preferring open aridhabitats. At present, the given area is mostly covered with agricultural plots - pastures and cornfields near the bank of the river Mtkvari, with irrigated cornfields and vegetable gardens at some places. The floodplain landscape follows the river bank as a narrow strip. The abele, black poplar and willow riparian woodland on the right bank of the river Mtkvari with blackberry, lancelet and ivy undergrowth is preserved only on the territory of Krtsanisi woodland park and in the lower reaches of the river. There are large trees preserved in the woodland park. As for other areas, no forest vegetation grows here. The beds of small rivers are overgrown with reeds and bushes - blackberry, lancelet, blackthorn, hawthorn and lout. They are mostly used by the locals for their vegetable patches.

The fauna in the considered area - within the road corridor and adjacent areas - is very much impoverished as the human started to cultivate the given area long time ago, has densely

populated it and intensely uses it for agricultural, economic, industrial, waste disposal and recreational purposes. A part of the construction corridor lies next to the territory of Krtsanisi woodland park, which is made up of the forests grown by humans and is a recreational site.

Near location of the settled areas and absence of fence or other defensive structures has a negative impact on the content of fauna in the given area.

Despite the fact that the fauna in the given area may be considered as a single complex, the extension area of different species over the sites covered with different biotypes is different. We think the identification of two groups of biotypes purposeful: Urbanized sites (with dense town or village development and industrial enterprises) - km11+300 – 11+600 and km17+00 – 17+800.

The steppes, hilly and foothill landscapes witch Botriochloa and Stipa steppes, dry shrub land (shiblijak), dwarf-shrub (phrygana) and semi-desert vegetation over the hill slopes and in gullies.

It occupies the greatest part of the future construction area of the road. - km11+00 – 17+00.There are saline areas here and there along the section. Below, in the table 4.13 distribution of the protected species by the landscape types is given

Table4.13. Animal species included in the Red Data List of Georgia (2006)

№	*Latin Name*	*Georgian Name*	Common Name	Status	Urban	Steps	*Note
Mammals							
1.	*Rhinolophus euryale*	სამხრეთული ცხვირნალა	Mediterranean Horseshoe Bat	VU	+		Colonies and Buildings, Caves, feeding in the forest
2.	*Rhinolophus mehelyi*	მეჰელის ცხვირნალა	Mehely's Horseshoe Bat	VU	+	+	Colonies and Buildings, Caves, feeding in the Steps
3.	*Cricetulus migratorius*	ნაცრისფერი ზაზუნელა	Grey Dwarf Hamster	VU		+	Stone piles
4.	*Mesocricetus brandti*	ამიერკავკასიური ზაზუნა	Brandt's Hamster	VU		+	Fields and pasture
5.	*Meriones tristrami*	მცირეაზიური მექვიშია	Tristram's Jird	VU		+	Fields and pasture
Birds							

№	*Latin Name*	*Georgian Name*	Common Name	Status	Urban	Steps	*Note
6.	*Buteo rufinus*	ველის კაკაჩა	Long-legged Buzzard	VU		+	possibility building nest
7.	*Aquila heliaca*	ბექობის არწივი	Imperial Eagle	VU		+	Feeding area
8.	*Aquila chrysaetos*	მთის არწივი	Golden Eagle	VU		+	Feeding area
9.	*Neophron percnopterus*	ფასკუნჯი	Egyptian Vulture	VU		+	Feeding area
10.	*Aegypius monachus*	სვავი	Cinereous Vulture	EN		+	Feeding area
11.	*Gyps fulvus*	ორბი	Eurasian Griffon	VU		+	Feeding area
12.	*Falco cherrug*	გავაზი	Sacker	CR		+	During Migration
13.	*Falco biarmicus*	წითელთავა შავარდენი	Lanner Falcon	VU		+	During Migration
14.	*Aegolius funereus*	ჭოტი	Boreal Owl	VU			possibility building nest
15.	*Grus grus*	რუხი წერო	Common Crane	EN		+	During Migration
16.	*Panurus biarmicus*	ულვაშა წივწივა	Bearded Tit	VU			possibility building nest
Reptile							
17.	*Testudo graeca*	ხმელთაშუაზღვეთის კუ	Mediterranean Tortoise	VU		+	Lives
18.	*Ophisops elegans*	კოხტა გველთავა	Snake-Eyed Lizard	VU		+	Lives near Lake Kumisi
19.	*Eryx jaculus*	დასავლური მახრჩობელა	Western Sand Boa	VU		+	Lives
20.	*Eirenis collaris*	საყელოიანი ეირენისი	Collared Dwarf Snake	VU		+	Lives
Amphibian							

№	*Latin Name*	*Georgian Name*	Common Name	Status	Urban	Steps	*Note
21.	*Pelobates syriacus*	სირიული მყვარი	Syrian Spadefoot Toad	EN		+	Lives in old reservoirs
Fish							
22.	*Sabanejewia aurata*	წინააზიური გველანა	Goldside loach	VU			Lives in River Mtkvari tributaries and branches
Insects							
23.	*Manduca atropos*	სფინქსი მკვდართავა	Death's Head Sphinx	EN			Lives
24.	*Bombus fragrans*	ველის დიდი ბაზი	Violet Carpenter bee	VU		+	Lives
25.	*Xylocopa violacea*	იისფერი ქსილოკოპა	Violet Carpenter bee	VU		+	Lives
26.	*Onychogomphus assimilis*	მსგავსი ნემსიყლაპია	Dark Pincertail	VU		+	reproduction in old reservoir

One species of fish included in the National Red Data List dwells in the river Mtkvari and its tributaries - Goldsideloach (Sabanejewia aurata). Particular attention is needed to avoid fueling of techniques beyond the river floodplain borders so that to avoid the water pollution with fuel and lubricants.

Species not protected by the law

Small mammals and reptiles not included in the Red Data List may perish in minor quantities, if their habitats are disturbed during the construction works. For instance many European pond turtles (Emys orbicularis) may perish if fuel pours in the waters of the branches of the river Mtkvari at the right bank of the river or if the operation of the techniques causes the river banks destruction damaging the sites of their oviposition.

Particularly sensitive to the loss of shelter are cheiroptera, the bats. They use caves, old buildings and hollow trees as shelters. Small caves in the rocks on the right bank of the river Mtkvari. Depending on the dates of the construction start-up, there may maternal (nidifugous) or winter colonies be formed in the hollows. Prior to the construction works start-up, the trees must be examined for the presence of bats and any facts of bats dwelling in them must be communicated to the representatives of the Ministry of Environmental Protection of Georgia. There are 29 bat species in Georgia, and all of them are protected under the Agreement on the Conservation of Bats in Europe (EUROBATS). 13 bat species are likely to occur within the limits

of the corridor (See Table 4.14). Only Common Noctule Bat (Nyctalus noctula) forms significant populations in the hollows of the aged abele tree hollows, the *nidifugous* colonies. Cutting down of such a tree during the breeding of young birds, will badly damage the given population of bats. Other bat species will be damaged less, if some individual trees are cut down.

Table 4.14.Cheiroptera species likely to dwell in the road construction corridor

#	Latin name	Common name	Georgian name	Shelters
1	*Rhinolophus ferrumequinum*	Greater Horseshoe Bat	დიდი ცხვირნალა	Buildings, Caves
2	*Rhinolophus hipposideros*	Lesser Horseshoe Bat	მცირე ცხვირნალა	Buildings, Caves
3	*Rhinolophus euryale*	Mediterranean Horseshoe Bat	სამხრეთული ცხვირნალა	Buildings, Caves
4	*Rhinolophus mehelyi*	Mehely's Horseshoe Bat	მეჰელის ცხვირნალა	Buildings, Caves
5	*Eptesicus serotinus*	Serotine	მეგვიანე ღამურა	Trees
6	*Myotis blythii*	Lesser mouse-eared bat	ყურწვეტა მღამიობი	Buildings, Caves
7	*Myotis mystacinus*	Whiskered Myotis	ულვაშა მღამიობი	Buildings
8	*Pipistrellus pipistrellus*	Common Pipistrelle	ჯუჯა ღამორი	Buildings
9	*Pipistrellus pygmaeus*	Soprano Pipistrelle	პაწია ღამორი	Buildings
10	*Pipistrellus kuhlii*	Kuhl's Pipistrelle	ხმელთაშუაზღვის ღამორი	Buildings
11	*Nyctalus noctula*	Noctule	მეღამურა	Trees
12	*Nyctalus leisleri*	Lesser Noctule	გიგანტური მეღამურა	Trees
13	*Plecotus auritus*	Brown Long-eared Bat	რუხი ყურა	Buildings

The only group of animals under the danger of a significant harm during the road building and operation, is cheiroptera. Ten species of them form colonies - the nidifugous colonies when they breed young animals (maternity colonies) and winter colonies when they hibernate. The bats form colonies in less crowded basements or attics, underground communications and natural caves. Besides, three bat species (see table 4.14) form colonies in tree hollows. The premises are to be demolished and old trees are to be cut down in the process of constructing of the local road.

All cheiroptera in Georgia are protected under the Agreement on the Conservation of Bats in Europe (EUROBATS). The presence of bat populations in the buildings to be demolished or trees to be cut down can be examined with ultrasound detectors It should be noted that there is a range of species spread in the construction area, which is a subject of societal interest. These are wild species and species interesting to tourists and ornithologists (bird-watchers). They include eight mammals given in table 4.15 below.

Table 4.15.Mammals interesting to the local population

#	Latin name	Common name	Georgian name

1	*Lepus europaeus*	European Brown Hare	კურდღელი
2	*Myocastor coypus*	Coypu	ნუტრია
3	*Canis lupus*	Grey Wolf	მგელი
4	*Canis aureus*	Jackal	ტურა
5	*Vulpes vulpes*	Red Fox	მელა
6	*Meles meles*	Eurasian Badger	მაჩვი
7	*Martes martes*	European Pine Marten	ტყის კვერნა
8	*Felis silvestris*	Wild Cat	ტყის კატა

A red fox often appears on the road to seize the animals perished in the car accidents. Other animals in the table use the territory irregularly, with more or less probability, to find food or move along the river. Most of the mammals appear in Krtsanisi Woodland Park and on small wood and bush islands along the rivers and channels.

4.3.2 Description of Biotopes in Project Area

Urbanized sites: The animals dwelling in the developed areas, are used to people and cars, intense noise and illumination in the night period. There is a society developed in the given area made up of minor species. The number of individual species, except totally synanthropic species, such as rats, mice and sparrows, is generally great. However, the given societies are quite stable to the changing conditions and anthropogenic impact. Due to a large number of wild cats, village and stray dogs, the appearance of any protected species in the given area is less likely.

The only group of animals under the danger of a significant harm during the road building and operation, is cheiroptera. Ten species of them form colonies - the nidifugous colonies when they breed young animals (maternity colonies) and winter colonies when they hibernate. The bats form colonies in less crowded basements or attics, underground communications and natural caves.

All cheiroptera in Georgia are protected under the Agreement on the Conservation of Bats in Europe (EUROBATS). The presence of bat populations in the buildings to be demolished or trees to be cut down can be examined with ultrasound detectors.

The steppes, hilly and foothill landscapes witch Botriochloa and Stipa steppes, dry shrubland (shiblijak), dwarf-shrub (phrygana) and semi-desert vegetation over the hill slopes and in gullies. There are saline areas here and there. Under variants 1 and 2 (version “plan”), the road will cross the given landscape from KP 9,5 km to Rustavi entry. According to variant 2 (version “document”), the road runs across the steppes from KP 14 km to Rustavi entry. Variant 3 runs across the given landscape from KP 7.5-8 km to Rustavi entry.

Due to the busy roads (Tbilisi-Red Bridge and Tbilisi-Tetritskaro), near location of settled areas and enterprises, all natural functions of the area are diminished. Because of a great number of

village, shepherd's and stray dogs, the appearance of protected large mammals in the area is less likely.

The area of Tristram'sJird (Meriones tristrami) on the right bank of the river Mtkvari is of an alternating width, and the colonies of these rodents in the construction corridor are likely to appear at the end of summer.

The area of a Snake-EyedLizard (Ophisops elegans)is known in the environs of Ialguji mountain and lake Kumisi. How far it goes westwards is not known, but the probability of the given species to appear cannot be excluded on the plain with the road running across it.

These sites are used by many large birds of prey to ascent, hovering in the ascending warm air currents and finding food.

The main functions of the given section are as follows:

1. Stopping site during the migration of a range of large birds of prey
2. Feeding site during breeding the young birds and autumn roaming
3. Habitat of GreyDwarf Hamster (Cricetulus migratorius) and Brandt's Hamster (Mesocricetus brandti),the mammals included in the Red Data List of Georgia
4. Habitat of Mediterranean Tortoise (Testudo graeca), WesternSandBoa (Eryx jaculus) and Snake-EyedLizard (Ophisops elegans), the reptiles included in the Red Data List of Georgia
5. Habitat of Syrian Spadefoot Toad (Pelobates syriacus), the amphibian included in the Red Data List of Georgia
6. A possible habitat of Tristram'sJird (Meriones tristrami), the species included in the Red Data List of Georgia.

5. SOCIO-ECONOMIC CONDITIONS

5.1 Demography

The main purpose of current research is description the socio-economic conditions of the affected population and assessment the impact of the road reconstruction project. The road does not pass through any villages in the vicinity of the settlement and therefore not directly impacts to the agricultural land of private owners, house and other buildings and structures, orchards; It does not cross even the pastures.

To obtain information about the conditions of population on Kvemo Kartli region, opinions of population informed about the existed case have been studied.

The survey also used the direct interview method using a specially designed questionnaire (see Appendix I). Office study was conducted to process the information received from national statistical service.

The study area and the administrative arrangement

The area of Kvemo Kartli region is 6901 km^2 which is 10 % of the whole territory of Georgia. The region from the east is bordered by Kakheti region, from the north – Shida Kartli and Mtskheta-

Mtianeti region, from the west – Samtskhe-Javakheti and from the south is bordered with Azerbaijan and Armenia.

Administrative-territorial units of Kvemo Kartly are as follows: Self-governing city Rustavi, Gardabani, Bolnisi, Tetritskaro, Dmanisi and Tsalka municipalities. The region's administrative center is Rustavi. Tere are 1 self-governing cities, 6 municipalities, 8 boroughs, 121 town councils which comprises 363 villages.

The distance between Tbilisi and Rustavi is 28 km.

More than 497 272 people line in Kvemo Kartly region, 63,62% of them are Georgians, 28, 62%, Azeri, 4,2%-Armenian and 3,56% of different nationalities, 56 116 086 thousand people live in Rustavi.

5.2 Socio-economic characteristics

5.2.1 Introduction

As a result of the project implementation, 51 land plot owners, who are physical entities, will be subject to impact; in addition, 8 persons are going to lose their jobs.

None of the physical entities owning the land plots in the project area, lives on the said territories. A social survey was held on August 1-30 of 2014. 3 owners of the plots out of the 53 land plots could not be identified. 39 APs out of 51 APs (making 78% of the identified land plot owners) owning 50 land plots were interviewed. All 8 persons going to lose their jobs as a result of the project implementation were interviewed during eth social survey. Consequently, 47 APs out of 59 APs under impact were interviewed. This makes almost 80% of the total number.

5.2.2 Number and size of affected households

70. 26 of the surveyed households (53.3%) have 3-5 members, while households including 6-10 constitute 17 % (8 house) and those with less than 3 members comprise 27.7% (13 household). About 4.2% of HHs in the sample are headed by women. The average household size is 3.1. All (47 out of 47) interviewed parties agreed to provide information on their households, which was used for the analysis. See **table 10.**

Table 5.6: Size of the surveyed households

Household Size	Number	Percent
1 and 2	**13**	**17**
3 – 5	**26**	**53.3**
6 – 10	**8**	**27.7**
Total	**47**	**100**

5.2.3 Age, Marital Status and Education Level

The families of the interviewed 59 APs are 186 people, with 90 (48.4%) women and 96 (51.6%) men. The age and gender distribution of affected people is shown in the following table:

Table 5.7: Age and Gender Distribution of Affected People

	<6 year	7-18 year	19-65 year	65+ year	Total
Male	**12**	**17**	**36**	**25**	**90**
Female	**13**	**14**	**39**	**30**	**96**
Total	**25**	**31**	**65**	**55**	**186**

A total of 30.1% (56 persons) affected people are under 18 years of age. This group is either in process of studying or not yet attending the school. In the same time, 109 (58.6%) have higher education, while the remaining 11.3 % have completed secondary and vocational education.

The demographic profile of households is shown in the following table:

Table 5.8: Demographic Profile of Affected Households

Average size of affected households	3.1
Minimum size of affected households	1
Maximum size of affected households	8

5.2.4 Ethnic Composition

Statistically, the area where the project zone is located is settled by Azerbaijani and Armenian people. Despite this fact, 96.3% of the people affected as a result of the project implementation are Georgians. As for other nationalities, 4.3% are Azeri and 2.1% are Russians. Such a great difference in the ethnic composition of the local population and project-affected people is due to the fact that the land plots in the project zone are for summer cottages only with most of their owners living in Tbilisi.

Table 5.9 shows the ethnic composition of the families affected by the project implementation

Table 5.9: Nationality of Affected Heads of Households

Nationality	Number	Percentage
Georgian	44	93.6

Azeri	2	4.3
Russian	1	2.1
Total	**47**	**100%**

5.2.5 Economic Activities and Livelihoods

A total of 58 households reported to have an income, from which 14 (23.7%) of households rely on one source of income, while 22 (33.3%) households have two sources of income and 11 families (18.6%) have 3 sources of income. Among 14 households that rely on one source for income, 2 households depend on pensions only. Maximum reported monthly income is 33000 GEL (two AP) while minimum was 150 GEL for households who had income. See table 6.0.

Table 6.0: Main sources of income households

Occupations of affected household members	Number of HH	%
Daily labour	15	25.4%
Pension	22	37.2%
Permanent private sector employment	40	67.7%
Permanent government employment	6	10.1%
Business	8	13.5%
Agriculture	0	0

As the study has evidenced, the monthly incomes of the APs are higher than average monthly income in the region. This is due to the fact that up to 80% of the APs live in Tbilisi, where the major resources of eth country are accumulated. The detailed information about the places of residence of the project-affected people is given in Table 6.1

Table 6.1: Places of residence of the project-affected people

City	Amount of Households	Percentage
Tbilisi	46	78
Rustavi	6	10.1
Gardabani	4	6.8
Zugdidi	2	3.4
Tsalenjikha	1	1.7
Total	59	100

General information related to the monthly household income s given in Table 6.3

Table 6.3 Reported monthly household income of surveyed households (per household member)

Income range (in GEL)	Number of HH	%

500 and below	6	12.7
500 - 1000	14	29.8
1000 - 2000	19	40.5
2000-1000-	6	12.7
10000 and above	2	4.3

The following table 6.5 shows minimum, maximum, average data on household income and expenditures.

Table 6.5: Household income and expenditures

	Income (GEL per month)	Expenditures (GEL per month)
Minimum	150	150
Maximum	33000	5000
Average	2079	820

As one can see, the average monthly incomes of the families of the APs are several times higher than the similar indicator of the country. This is caused by the following reasons: one plot under the impact has two owners (father and a son), who are the founders of one of the largest companies in Georgia “Embawood”, and the annual income of each of them is 400.000 Gel making approximately 33.000 Gel a month. Consequently, the income of the two people is higher than the sum of the incomes of all other 45 APs. This results in the higher figure of the average monthly income. If not considering the two owners, the average monthly income of the other 45 HH is 705 Gel, with monthly expenses of 635 Gel.

Lastly possession of household items and vehicles, shown in the table 17 below, confirms that the affected population is generally in line with Georgian averages. For example, average possession of cars in Georgia (World Bank, data for 2010) is 130 cars per 1,000 inhabitants. This is equivalent to about 60% of households having a car.

Table 6.6: Possession of Household Items and Vehicles

Item	**Possess (%)**	**Do not possess (%)**
Refrigerator	100	0
Washing machine	100	0
Car	59.5	40.5

Motorcycle	6.4	93.6
Bicycle	8.6	91.4
Gas cooker	97.9	2.1
Heating system	10.6	89.4
Air conditioner	10.6	89.4

Most of the affected families, 36 (76.5%) live in their own private houses. 11 of them live in their own houses: one of them (2.1%) has a one-storey house, 9 APs (19.1%) have two-storey houses and one AP (2.1%) has a three-storey house.

Every affected person has access to medical services. In the area where project road is located there is a school and a kindergarten.

A total of 100% (47 households) of APs are connected to the central water supply system. In the meantime 100% (47 households) also connected to a central sewerage system. All the APs are connected to power supply system.

The information above about the location of the communal infrastructure and educational and medical institutions is about the places of residence of the APs. As for the land plots owned by the APs, this infrastructure is located 5-8 km from the plots. However, it should be noted that the owners of the private land plots visit their plots for some hours only. Consequently, the absence of the necessary social infrastructure is not a problem for these APs. As for the water- and gas-supply, this problem is planned to solve within the scope of the ongoing project.

As for other infrastructural objects, such as an access road, gas-supply, electrical power and sewerage, the initial option of the project for the third section of Tbilisi-Rustavi express road considered the construction of the gravel road. As for the water-supply and water drainage, the initial option of the project did not consider these infrastructural elements.

At the meetings with the population and public consultation held by the Municipal Development Fund on September 4, 2014, the population stated about their wish to make a number of changes to the project to include: (i) asphalting the access road, (ii) building the water-supply system and (iii) building the gas-supply system.

Their wish was considered by MDF, the project implementing organization and consequently, the final version of the project envisages the construction of the infrastructural objects desirable by the population.

5.2.6 Vulnerability

Efforts were made during the census to identify poor and vulnerable households. Data has to be verified with the Social Service Agency of the Ministry of Labour, Health and Social Affairs of Georgia. It is estimated that 20 of the total 51 affected households are vulnerable.

Consequently, 20 vulnerable people are going to be affected by the project. All of them are refugees.

5.3 Expected social impact of the Project

5.3.1 General social impact of the Project

The proposed Project has short and long-term impacts on the local population. The social impact of the road reconstruction Project should be considered within the context of improvement of traffic safety and traffic conditions in big cities (Tbilisi, Rustavi) and transit potential of Georgia. The impact will be significant not only for the whole country, but for the population living along the road.

At present, the traffic safety level along Tbilisi-Rustavi road is not satisfactory (particularly complex is Rustavi-Ponichala section). The Project guarantees the traffic safety consistent with the international standards. The Project guarantees the international-level road capacity and safety of the transit cargo streams from Azerbaijan. The Project is important for cargo streams (by modernized mains from Rustavi to Tbilisi detour and then, by the detour) and passenger car streams, which will presumably travel through Tbilisi.

As a result of the project implementation, 85 land plots are subject to impact. The total area of the land plots is 82,2367 ha, and the area of the land plots under the direct impact of the project is 6,0457 ha. The average impact rate in terms of surface is approximately 7.3 %. Such a low percentage is due to the fact that two affected land plots with their total area comprising a half of all other 83 affected land plots are affected by the project to a minor extent. In particular:

1. The plot with the area of 38,8573 ha loses only 0.38% (making 0.1084 ha) as a result of the project implementation.
2. The plot with the area of 13,8506 ha loses only 0.01% (making 0.0012 ha) as a result of the project implementation.

5.3.2 Impacts to Employment

As already mentioned, there are 10 land plots owned by legal entities in the project zone. At present, no commercial activity takes place on 5 plots out of the 10; other 4 plots are used by their owners for commercial operations, while the owner of the last plot is engaged in the construction operations in the area owned by him. As a result of the project implementation, one business will be suspended and 8 people are losing their jobs.

5.3.3 Other Impacts

5.3.3.1 Impacts to Indigenous Peoples

The Project has no impact on Indigenous Peoples as there are no Indigenous Peoples in Georgia.

5.3.3.2 Gender Impacts

Based on the percentage derived from the socio-economic survey it is estimated that the Project affects a total of 5 female headed households.

5.3.4 Non-viable ("Orphan") Land

Non-viable, "orphan" land is land that is affected partially to such an extent that the unaffected remainder becomes uneconomical. This can be the case in a variety of situations, including, but not necessarily limited to the following:

- Because the remainder is too small to be used for any economically meaningful purpose (particularly in the area to build a house or industrial building);
- Because vehicular or pedestrian access to the remainder is not possible any longer after the Project is built;
- Because access to vital infrastructure (for example irrigation, sewerage or electricity) is not possible any more.

In such situations, Georgian expropriation regulations provide that the landowner may lodge a claim and that non-viable land may be compensated in full if the review of the landowner's request indicates that the remainder is indeed not usable. The Project will adopt a similar strategy with regards to non-viable land, even where land acquisition is not undertaken through expropriation.

There are some plots under a partial impact adjacent to the project area. As a result, the rest of the plot area is no more useful for their owners. Consequently, all such plots were studied within the limits of the project and purchased from their owners on the mutual agreements with them.

28 of the total 85 land plots affected by the project come to be in the buffer zone by 100%. 17 plots out of the 28 were owned by the state, 2 plots were owned by legal entities and 9 plots were owned by private entities. At the beginning, none of the said 11 privately owned plots came to be in the buffer zone by 100% under the project, but in any case, the survived land plot was not a bit attractive to either legal, or private entities. Consequently, all 11 land plots were purchased by 100% within the scope of the project.

5.3.5 Vulnerable Households

62. Efforts were made during the census to identify poor and vulnerable households. Data has need verified with the Social Service Agency of the Ministry of Labour, Health and Social Affairs of Georgia. It is estimated that 20 of the total 51 affected households are vulnerable. Consequently, 20 vulnerable people are going to be affected by the project. All of them are refugees.

5.3.6 Severely Affected Households

The LARF defines severely affected households as those losing 10% of their income or more. Past practice has been to assume that households losing 10% of their land were severely affected. However, while this was adequate for marginal impacts of linear projects to agricultural land, it needs to be complemented by supplemental provisions for the present Project, as recommended in the following paragraph.

Severely affected households include:

- All households losing 10% or more of their productive, income generating assets;
- All business owners losing their business partially or temporarily.

39 land plots out of 50 (78%) will be subject to the severe impact of the project. The 39 plots are owned by 38 owners. 4 APs own two plots each, and 1 plot is owned by 4 APs.

The following table shows the breakdown of severely affected households:

Table 6.7: Severely Affected Households

Category of severely affected households	Number of households
Households losing 10% of their productive, income generating assets or more	39
Business owners	1
Total	**40**

5.3.7 Summary of Impacts

The following table shows the overall summary of impacts:

Table 6.8: Impact Summary

TYPE OF IMPACT	IMPACT INDICATORS		
LAND	***Affected Plots (number)***	***Affected Area (sq.m.)***	***Affected Households***
A. Private Land			
Type 1: Private registered land	**50**	**21077**	**59**

Type 2: The land plots with unknown owners	**3**	**342**	**-**
Type 3: The land plots owned by legal entities	**10**	**8014**	**8**
Sub-total A	**53**	**29443**	**59**
B. Public Land			
Type 6: Public Land (not used by private users)	**22**	**31024**	**-**
Sub-total B	**22**	**31024**	**-**
Total (Land)	**85**	**60457**	**59**
STRUCTURES	***Affected Structures***	***Affected Area (m2)***	***Affected Households***
Auxiliary building	3	53.56	3
Gate	4		4
Fence	22	675.42[1]	22
Movable booths	2	8	2
Movable carriage	1	40	1
Petrol station (inactive)	1	181.1	1
Concrete cover	5	1680.59	5
Asphalt cover	1	150	1
Total (Structures)	**39**	**2113.25**	**39**
TREES	***Affected Trees***		
Young (0-5 year old)			31
Young adult (5-9 year old)			32
Adult (10-14 year old)			29
Adult (15 and more)			
Total (Trees)			**92**
BUSINESSES	***Affected Businesses***		

[1] Fence is measured in meters.

Real estate agency	1
Electrical power distribution com Electrical power distribution company	1
Oil transportation	1
Production of agricultural products	1
Entrepreneurship	1
Buying/selling cars	3
Petrol Station	1
Car wash	1
Total (Businesses)	**10**
Affected Business Employees	**8**
VULNERABLE HOUSEHOLDS	***Affected Vulnerable Households***
Total (Vulnerable Households)	**20**
SEVERELY AFFECTED HOUSEHOLDS	***Severely Affected Households***
Physically displaced households	0
Households losing 10% of their productive assets or more	39
Business owners	1
Total (Severely Affected People)	**40**

Mitigation measures

Project implementation causes some inconvenience and negative impact as on population, on natural environment as well. It is impossible to avoid these impacts, but is possible to mitigate them by proper planning, implementing and initial studying of potential impact

Possible negative impact	**Mitigation measures**
Dust, vibration and noise caused by construction technique	During the movement of construction technique some restrictions should be selected - time of working should be

	determined, also watering of road during the technique movement on the roads
Decreasing of availability of pastures	The access roads the be marked initially, if timely access will not provided, the damage should be compensated.
Decreasing of pasture quality	Construction wastes should not be disposed near the pastures. destroy the stones and use quarries
Possible increase of diseases	Appropriate prophylactic checkups in ambulatory
Restriction of movement of pupils and population	Arrange the special signs and carry out the trainings as in schools as for population; movement speed restriction
excessive expectations of population, including about employment	The right communication strategy (see below)

5.3.8 Construction-related social impacts

In a short term perspective, the Project will bring a certain benefit for the local population, as it will create employment prospects (approximately 100 new jobs will be generated for the local population). The resettlement impacts are described in Section 5.3.

Impact. Negative impact caused by construction disturbance (dust, emissions, noise) is temporal, insignificant and controllable through using good construction practice.

Mitigation. Dust control by watering; using at least 2 tanks; noise control, installing mufflers to the equipment; working by day.

Impact. Secondary biological pollution (e.g. anthrax) caused by the ground works near the soil nidi of infection (e.g. unregistered anthrax pits).

Mitigation. Permanent monitoring during the ground clearance and excavation works. Stopping or suspending the construction works in case of a pit discovery. Notification of the local service of the veterinary department and using veterinary sterilization measures before renewing the works.

Impact. Dangerous traffic conditions with overlapping traffic flows with the existing traditional traffic.

Mitigation. Consideration of proper preventive measures and safety signs along the roads under the project, including illumination, and instructing the drivers.

Impact. Infrastructure. The major elements of communal infrastructure, which can come under the impact, are transmission lines, water-supply systems and irrigation pipes and channels.

Mitigation. Dislocation and rehabilitation of the infrastructural elements; permanent monitoring

during construction; full rehabilitation in case of damage.

Impact. Potential conflict with the local population because of impact on water-supply and power-supply sources, as well as other infrastructure, impact on the access to ground or infrastructure, noise disturbance, conflicts with workers, etc.

Mitigation. A building contractor must assign an officer to communicate with the local population and must develop a communication plan. All conflicts must be settled by negotiations and reasonable compromises.

5.4 Land Acquisition and Resettlement

The detailed Resettlement Action Plan is under preparation. The census surveys, detailed measurements, sociological assessment and other field works are under the way.

Principles Adopted for the Project

To reconcile the gaps between Georgia laws/regulations and ADB's SPS (2009), MDFG has drafted this LARF for the Project, which, after endorsement by the Government, is seen as a tool for ensuring compensation at replacement cost of all items, the rehabilitation of informal settlers, and the provision of subsidies or allowances for AFs that may be relocated, suffer business losses, or may be severely affected.

LARF Principles and Entitlements adopted for this MFF

Based on the Georgian laws on land acquisition and the provisions on involuntary Resettlement in the ADB *Policy Safeguards Statement (2009)*, core involuntary resettlement principles are developed for this MFF which are as follows:

- Land acquisition, and other involuntary resettlement impacts will be avoided or minimized exploring all viable alternative project designs;
- where unavoidable, a time-bound LARP will be prepared and APs will be assisted in improving or at least regaining their pre-program standard of living;
- consultation with APs on compensation, disclosure of resettlement information to APs, and participation of APs in planning and implementing sub-projects will be ensured;
- vulnerable and severely affected APs will be provided special assistance;
- non-titled APs (informal dwellers or squatters) will receive a livelihood allowance in lieu of land compensation and will be fully compensated for losses other than land;
- legalizable APs will be legalized and fully compensated for land losses;
- provision of income restoration and rehabilitation to all APs;
- the LARP will be disclosed to the APs in the local language;
- payment of compensation, resettlement assistance and rehabilitation measures will be completed prior to the contractor taking physical acquisition of the land and prior to the commencement of any construction activities on a particular package; and
- establishment of appropriate grievance redress mechanisms to solve APs grievance if occurs.

Eligibility

APs entitled for compensation or at least rehabilitation provisions under the Project are:

- All APs losing land either covered by legal title/traditional land rights, localizable, or without legal status;
- Tenants and sharecroppers whether registered or not;
- Owners of buildings, crops, plants, or other objects attached to the land; and □APs losing business, income, and salaries.

Compensation eligibility will be limited by a cut-off date to be set for each subproject on the day of the beginning of the AP Census and DMS. APs who settle in the affected areas after the cut-off date will not be eligible for compensation. They, however will be given sufficient advance notice, requested to vacate premises and dismantle affected structures prior to project implementation. Their dismantled structures materials will not be confiscated and they will not pay any fine or suffer any sanction.

Compensation Entitlements

Entitlement provisions for APs losing land, houses, and income and rehabilitation subsidies will include provisions for permanent or temporary land losses, buildings losses, crops and trees losses, a relocation subsidy, and a business losses allowance based on tax declarations and/or lump sums. These entitlements are detailed below:

- **Agricultural land impacts** will be compensated at replacement value either with replacement plots of the same value of the land lost and at location acceptable to APs where feasible, or in cash free of transaction costs at current market rates or (if no land markets are active) based on the reproduction cost of the affected land. The cash at market rates option has been selected for the Program. When >10% of an AP agricultural land is affected, AP (owners, leaseholders and sharecroppers) will get an additional allowance for severe impacts equal to the market value of a year's gross yield of the land lost. In case of severe impact on other income, the APs will be paid additional compensation corresponding to 3 months of minimum subsistence income. Transaction taxes/fees will be paid by the EA or waived. Legalisable APs will be legalized and paid as titled owners. Non-legalizable APs will be compensated with one time self-relocation allowances in cash equal to 1 year of minimum subsistence income. Residual non-affected sections of a plot that becomes inaccessible or unviable to use after acquisition will also be compensated.
- **Non agricultural land** (Residential/commercial land). Legal settlers will be compensated at replacement rate either with replacement plots of same value as plots affected and at location acceptable to APs where feasible, or in cash at current market rates, free of transaction cost. The cash at market rates option has been selected for the Program. Renters/leaseholders will receive 3 month rent allowance. Non-titled/non-legalizable land users will be compensated with a 1 time self-relocation allowance in cash equal to 1 year of minimum subsistence income. This allowance is to be to be calculated based on a 5 people family and the monthly updated benchmarks indicated by the National Statistics Office of Georgia at time of LARP approval

- **Houses, buildings, and structures**. In order to address potential damages of vibrations or discomfort caused by road traffic, these items will be compensated in full for the whole building irrespective of the specific degree of impact. Compensation will be provided in cash at replacement cost free of deductions for depreciation, transaction costs or salvaged materials. All relevant APs are entitled to this provision by default irrespective of the registration status of the affected item.
- **Crops**: Cash compensation at current market rates for the gross value of 1 year's harvest by default irrespective of whether the crops were already harvested or not at the time of impact. Crop compensation will be paid both to landowners and tenants based on their specific share cropping agreements.
- **Trees:** Cash compensation at market rate based on type, age and productivity of trees.
- **Businesses:** If business is lost permanently it will be compensated in cash equal to a 1-year income based on tax declaration or, if unavailable, based on the official minimum subsistence income. Temporary business losses will be compensated in cash for the business interruption period based on tax declaration or, if unavailable, official minimum subsistence income.
- **Affected business workers/employees**: Indemnity for lost wages for the period of business interruption up to a maximum of 3 months.
- **Relocation allowance**: APs forced to relocate will receive a relocation subsidy sufficient to cover transport costs and living expenses for 3 months.
- **Vulnerable Peoples Allowance**: Vulnerable people (APs below poverty line and widow or elder headed households) will be given an allowance corresponding to 3 months of minimum subsistence income and priority in employment in project-related jobs. The allowance is to be to be calculated based on a 5 people family and the monthly-updated benchmarks indicated by the National Statistics Office of Georgia at time of LARP approval
- **Severe Impacts Allowance**; APs losing >10% of agricultural land or >10% of non-agricultural income will receive a 3 months severe impacts allowance. This allowance is to be calculated based on a 5 people family and the monthly-updated benchmarks indicated by the National Statistics Office of Georgia at time of LARP approval.
- Community Structures and Public Utilities: Will be fully replaced or rehabilitated so as to satisfy their pre-project functions.

5.5 SOCIO-CULTURAL ENVIRONMENT

5.5.1 Historical Context

Town-Fortress Rustavi

The town-fortress is located within the park of culture and recreation of modern t. Rustavi. Town-fortress Rustavi, the center of historical province Kukheti, is one of the oldest towns of Georgia. Rustavi had be the royal domain throughout the entire political-administrative development of the feudal epoch, which is confirmed by the ancient name of the town-fortress – Bostan-Kalaki (in Persian Vostan means royal court, while Kalaki is town in Georgian) and the fact that construction of a channel from r. Kura in the area is assigned to King Trdat in the

second half of IV c. Due to the channel the town was called “Rus Tavi” (Ru is a stream, Tavi – head, start). In V c. Vakhtang Gorgasali founded bishop cathedra in Rustavi.

According to written sources and archeological data, since IV-V c.c. till the second half of XIII c. Rustavi had be one of the most significant political, religious and trade-economic centers of Georgia. In 1265 the town was plundered by the Golden Horde Khan Berqa, as a result of which the town transformed into a smaller size village.

Archeological research of Rustavi clearly revealed its complex and difficult history. Archeological excavations have been undertaken since the 40s of the past century.

As a result of excavations remnants of fortification structures, gates, palaces, bathes, residential and economic buildings with communications and high quality consumption items of the early and developed middle ages (IV-VIII, IX-X and XII-XIII c.c.) have been found; burial mounds of early and developed middle ages; burial mounds of late bronze age and antiquity have been discovered as well.

Intensive urban life and close economic link with the remaining world is proved by Georgian and foreign coins (from Kupuri, Byzantium, Khorezm, Daruband, etc.) discovered as a result of excavations of the remnants of fortress and town.

The development of Rustavi into an urban center of the middle ages was greatly favored by the proximity to two significant caravan routes – Tbilisi-Bardavi and Southern Georgia-Kakheti-Hereti roads.

According to Arab and Persian geographers, Tbilisi-Bardavi trade road followed r. Kura gorge and passed through towns of Rustavi, Gardabani, Khunani, Shamkori, Ganja. From Bardavi the road divided into several directions.

Rustavi was built in the area, which could not be avoided if one was travelling to the heart of Kartli and of course the enemies invaded it first too. Excavations confirm numerous falls and revivals of the city.

5.5.2 Cultural Heritage in Project Area

It should be noted that the above described historical route does not coincide with the modern road of Tbilisi-Rustavi at all. According to the written sources, the old route – from Rustavi to Tbilisi crossed m. Iaghluja slope towards Kumisi lake, then entered Tbilisi from Tabakhmela-Shindsi. Remnants of route have been archeological confirmed on m. Iaghluja, it has been preserved till now and researchers have no doubts that it is the trace of the old route. Remnants of settlements and burial mounds dating back to antiquity and early Middle Ages have been discovered on m. Iaghluja as well.

As regards the18 km project section of Tbilisi-Rustavi road to be reviewed; special scientific literature does not contain indications towards any cultural monuments within the section. I have received verbal information from the archeologists, who are surveying remnants of Rustavi town and Tbilisi districts during various construction works. According to the information provided by them, the areas of the main and alternative alignment and adjacent territories have not been subject to special research until now. They have not heard about accidental discovery of archeological items in the area.

6. ALTERNATIVES ANALYSES

No-project variant means the conservation of the poor situation along Tbilisi-Rustavi section of Red Bridge-Tbilisi connection road, in particular, insufficient road capacity and low traffic safety will be maintained what will accordingly hamper the full application of the international transit potential of the country. Thus, No-project variant was ignored right at the early stage of the project development.

The main alternatives of Rustavi-Tbilisi speedway project are associated with the selection of the route of the section along Ponichala settlement. The given sub-project (2nd section of the road) is being developed as an individual project and the relevant alternatives analysis will be presented under the IEE specially developed for this sub-project. However, the present IEE is developed for Ponichala-Rustavi Local Roads Section 3 as part of Rustavi-Tbilisi highway only. The existing road is being widened along the given section and no alternative routes are considered.

However, due to the concerns expressed during the public consultations by different NGOs, we comment below on this issue in more details.

Technically, any shifting of the road from the existing alignment will only worsen the geometrical characteristics of the road (curves) and increase either ecological impact (Krstanisi Park) or resettlement impacts (private land plots and structures). Locations for the interchanges are either coinciding with the existing interchanges (reconstruction), or with the existing secondary roads and therefore are predetermined.

The project is not realized in a sensitive environment and no particular harmful impact on the natural environment is expected. The environmental impact level, provided the building norms and rules are observed, will be within the norm. Accordingly, there is no need for any additional principal alternatives for any environmental reasons.

7. ENVIRONMENTAL IMPACTS

7.1 Summary of Activities and Anticipated Impacts

The project was screened for environmental impacts and a summary of activities and anticipated impacts is provided below in relation to project phases. In the case of the design phase the analysis describes how these potential impacts have been and will continue to be incorporated in the project design process.

Pre-construction phase is mostly related with socio-economic issues, like acquisition of the land/property where the existing road is widened and the new route is built, and possible speculations gaining the compensations for the acquired land.

A Environmental Impacts – Design and Pre-construction Phase

#	Potential Impact	Comments
1	Degradation of natural landscape (relief, soil cover, vegetation, natural habitats) in the certain part of the right-of-way (land strips	**Particular sensitivities identified during design:** • During research of territory the field route from the species included in Georgian Red List 11 units of *Ulmus minor Mill* were determined. Damage and removal of these trees during

	adjacent to the highway – access roads, dumping sites, borrow pots). Sensitive ecosystems and sites of special importance Sites of archaeology and cultural significance, Existing human activities and land use – residential and farming land. Geohazard prone sites	construction works should be avoided to the extent possible. Compensatory planting is recommended the ratio of 1:10 as a mitigation measure, so 10 seedlings are planted instead of 1 cut tree (10 seedlings planted for each tree extracted). ● During the construction of local road 57 trees are under cut, included 11 units of *Ulmus minor Mill.* Replanting of other trees as minimum with ratio 1:3 • Vegetation within the area under consideration is altered and degraded. Most of the land plots are cultivated. **Resettlement issues were most important for optimal planning of the route**
2	Damage of infrastructure elements and the need to redesign road and/or plan for relocation of services and avoid disruption of services i.e. Railway & existing roads, Power transmission lines, Gas pipelines, Irrigation channels	The local road crosses several important infrastructure systems.
3	Location of borrow pits, waste disposal sites, any asphalt mixing sites, aggregate and concrete making facilities, workers camps, re-fuelling and storage places and equipment yards	Dust/air pollution, water pollution, landscape degradation impacts on aquatic life - will depend on careful choice of site location. Dust/air pollution, water pollution, landscape degradation impacts on aquatic life - will depend on careful choice of site location. At the detailed engineering stage EIA consultants have proposed certain sites. However, the final choice will be made later by the construction contractor.
4	Soil Erosion – Design of temporary and permanent drainage systems, retaining walls, berms and embankments, design of anti-erosion engineering measures and reinstatement plans	Proper design important to minimize potential erosion and secondary impacts: landscape degradation and increased sedimentation of watercourses and potential slow deterioration of the highway pavement.
5	Noise and traffic emission nuisance	Noise & emissions related to traffic is only a significant problem in densely populated areas & where residential properties adjoin the road. For Phonichala-Rustavi section we do not have such

		sites.

Construction phase. This is a large and complex development, involving major construction activities, so the construction phase is the period in which the greatest risk of negative impacts is present. However the work will involve basic techniques (excavation, earth-moving, etc) that are a component of the most construction projects, for which well-developed mitigation methods are available. This will be alter the topography and appearance of each site and location from which materials are obtained (note: use of existing licensed quarries is advisable, therefore impact on material abstraction site is not considered in the report in details) and where waste/soil is disposed. It could also change the flow patterns of surface and ground-water and affect its quality. As for impact on community - nuisance factors such as noise, dust, emission traffic and restriction of free movement for people and cattle is worth to mention.

Operation. Once it is in operation, the upgraded road is expected to gradually carry more traffic, comprising light/medium vehicles engaged in internal travel between the surroundings. The road may fall into disrepair, compromising the investment and road safety, if it is not adequately inspected, maintained and repaired. The operating road may affect natural and human environments via traffic noise, air pollution, water pollution with liquid/powder cargo and/or fuel and lubricants from the cars as a result of traffic accidents on the road section passing near culverts and/or the accidents on visual impacts, disturbance, etc. Measures are included in the design to avoid some of these. Socio-economic effects will be more significant, particularly for individuals and communities that currently depend on the road and who will be excluded in the future by bypasses and safety measures.

Environmental Impacts - Construction Phase

#	Potential Impacts During Construction Works	Yes/No Severity	Site Locations
1	Destruction of natural landscape (relief, soil cover, vegetation, eco-systems, habitats and wildlife) in the right-of-way occupied by the Local Road.	Yes High	• Road section from km 11.0 to km 17.0 • There are 11 units of *Ulmus minor Mill* were determined along the construction site
2	Destruction of natural landscape (relief, soil cover, vegetation, eco-systems, habitats and wildlife) on the access roads, in the borrow pit sites, waste dumps, construction camps and equipment yards.	Yes Minor	borrow pit sites, waste dumps, construction camps and equipment yards to be defined by construction contractor
3	Landslides, slumps, slips and other mass movements in road cuts triggered by the construction activities.	No	No existing landslides.
4	Erosion stimulated from fresh road cuts and fills	Minor	Near embankments.

	and temporary sedimentation of natural drainage ways. Erosion of lands below the road bed receiving concentrated outflow from covered or open drains.		
5	Increased suspended sediment in streams affected by erosion at construction sites and fresh road cuts, fills and waste dumps. Reduced water quality and increased sedimentation and impacts on water quality and fish breeding.	Yes Minor	**rivers –** Mtkvari: km 12.5 near the bridge crossing the gully with seasonal stream entering Mtkvari river
6	Impact of construction activities on aquatic ecosystems of the rivers and streams crossed by the local road	Minor	**rivers –** r.Mtkvari: km 11.0 - km 17.0
7	Soil and water contamination during construction by oil, grease, fuel and paint in the RoW, access roads, construction camps and equipment yards and asphalt mixing sites.	Yes Minor	Camp sites and quarries will be selected by Construction Contractor
8	Poor sanitation and solid waste disposal in construction camps and work sites (sewerage, sanitation, waste management)	Yes Medium	Camp sites and quarries will be selected by Construction Contractor
9	Construction wastes alongside the RoW and roadside litter.	Yes Medium	Whole alignment
10	Air pollution from vehicle operations during construction in populated areas traversed by the highway, notably metropolitan areas or densely settled rural areas. Local dust.	Yes Minor	Anywhere construction vehicles pass through settlements
11	Air pollution from any concrete batching plants.	Yes Medium	Supplier contractor's site locations
12	Noise pollution from vehicle operation during construction particularly in populated areas traversed by the highway, such as densely settled rural areas. Local noise.	Yes Minor	Rustavi km 17.0 – 17.8
13	Poaching by construction workers	No Minor	River Mtkvari
14	Creation of temporary breeding habitats for mosquito vectors of disease e.g. sunny, stagnant pools of water. Creation of stagnant water bodies in borrow pits, quarries, etc. suited to mosquito breeding and other disease vectors. Recontamination by infectious biological	Yes Minor	Small puddles could be created along the whole alignment; larger pools could be created at the borrow sites and quarries;

	materials (e.g. Anthrax) during earth works near the pest holes (i.e. not registered Anthrax sites)		
15	Health hazards by noise, air emissions and dust raised and blown by vehicles during construction activities.	Yes Minor	Rustavi km 17.0 – 17.8
16	Impacts on Archaeological Sites only undiscovered archeological relics could be an issue	Yes Minor	Whole alignment
17	Hazardous driving conditions where construction interferes with pre- existing roads. Traffic disruption during construction activities	Yes Minor High	At interference zones of the construction road with the existing main and rural roads Along the whole road
18	Impact on existing infrastructure: Relocation of overhead power lines within the right of way of the construction site:	Medium or High	Whole alignment: relocation of overhead lines, organization of crossings on BP's pipelines, relocation of communication cables
19	Accident risks associated with vehicular traffic and transport, that may result in spills of toxic materials, detonation of explosive load, injuries or loss of life	Yes Minor	Whole alignment but particularly Rustavi km 17.0 – km 17.8

Character of Main of the Anticipated Impacts - Construction Stage

Activity	**Impact**	**Character of impact**							
		direct	**Indirect**	**Positive**	**Negative**	**Reversible**	**Irreversible**	**Temporary**	**Waste**
Land clearance and grading in the RoW	Destruction of natural landscape, habitats, erosion	+			+		+		+
	Emissions	+			+	+		+	
	Noise, vibration	+			+	+		+	
	Ground pollution and/or waste generation		+		+	+		+	

	Ground and surface water pollution		+		+	+		+	
Construction of the new carriageway; pavement	Destruction of natural landscape, habitats, erosion								
	Emissions	+			+	+		+	
	Noise, vibration	+			+	+		+	
	Ground pollution and/or waste generation		+		+	+		+	
	Ground and surface water pollution		+		+	+		+	
Exploration of borrow pits	Destruction of natural landscape, habitats, erosion	+			**+**		**+**		**+**
	Emissions	+			+	+		+	
	Noise, vibration	+			+	+		+	
	Ground pollution and/or waste generation		+		+	+		+	
	Ground and surface water pollution	+			+	+		+	
Transportation of sand, gravel, stones from borrow pits. Material supply.	Destruction of natural landscape, habitats, erosion								
	Emissions	+			+	+		+	
	Noise, vibration	+			+	+		+	
	Ground pollution and/or waste generation		+		+	+		+	
	Ground and surface water pollution		+		+	+		+	
Disposal of spoil and wastes	Destruction of natural landscape, habitats, erosion								
	Emissions	+			+	+		+	
	Noise, vibration	+			+	+		+	
	Ground pollution and/or waste generation		+		+	+		+	
	Ground and surface water pollution		+		+	+		+	

Disposal of spoil and wastes	Destruction of natural landscape, habitats, erosion	+			**+**	**+**		**+**	
	Emissions	+			+	+		+	
	Noise, vibration	+			+	+		+	
	Ground pollution and/or waste generation		+		+	+		+	
	Ground and surface water pollution		+		+	+		+	

Environmental Impacts - Operations Phase

#	Potential Impacts During Operations Phase	Yes/No Severity	Site Locations
1	Air Pollution from increased use of the local road in future	Yes Minor	Whole alignment but particularly Rustavi km 17.0 – 17.8
2	Noise Pollution from increased use of the highway in future.	Yes Minor	Whole alignment but particularly Rustavi km 17.0 – 17.8
3	Water quality deterioration with increased dust from local road surfaces to water courses	Yes Minor	Whole alignment but particularly Rustavi km 17.0 – 17.8
4	Traffic safety problems	Yes	Whole alignment but particularly Rustavi km 17.0 – 17.8
5	Roadside litter.	Yes Medium	the level of safety will be improved
6	Soil and water contamination by oil, grease and fuel alongside the highway	Yes Minor	Whole alignment
7	Potential Operation Phase Emergency Related Impacts Accident risks associated with vehicular traffic and transport, that may result in spills of toxic materials injuries or loss of life(see 'Hazardous Materials Management' section), injuries or loss of life	Yes Minor	Whole alignment
8	Air Pollution from increased use of the highway in future	Yes Medium	Camp sites and quarries will be

			selected by Construction Contractor
9	Construction wastes alongside the RoW and roadside litter.	Yes Medium	Crossed settlements Whole RoW

Character of Main of the Anticipated Impacts - Operation Stage

Activity	Impact	Character of impact							
		direct	Indirect	Positive	Negative	Reversible	Irreversible	Temporary	Waste
Physical existence of linear installation	Destruction of natural landscape, habitats, erosion	+					+		+
	Emissions								
	Noise, vibration								
	Ground pollution and/or waste generation								
	Ground and surface water pollution								
Traffic	Destruction of natural landscape, habitats, erosion								
	Emissions	+			+				+
	Noise, vibration	+			+				+
	Ground pollution and/or waste generation		+		+	+		+	
	Ground and surface water pollution		+		+	+		+	
Maintenance works	Destruction of natural landscape, habitats, erosion	+		**+**					
	Emissions	+			+				+
	Noise, vibration	+			+				+

	Ground pollution and/or waste generation		+		+	+		+	
	Ground and surface water pollution		+		+	+		+	
Accidents	Destruction of natural landscape, habitats, erosion		**+**		**+**	**+**		**+**	
	Emissions		**+**		+	+		+	
	Noise, vibration								
	Ground pollution and/or waste generation		+		+	+		+	
	Ground and surface water pollution		+		+	+		+	

In the area covered by this IEE, the key environmental issues are likely to be:

- *Noise and air pollution impacts on closely located inhabited areas during construction and operation;*
- *Georgian Red List 11 units of Ulmus minor Mill were determined. Damage and removal of these trees during construction works should be avoided to the extent possible. Compensatory planting is recommended the ratio of 1:10 as a mitigation measure, so 10 seedlings are planted instead of 1 cut tree (10 seedlings planted for each tree extracted)*.
- *Destruction of natural landscape (soil cover, vegetation, eco-systems, habitats, wildlife, relief) in the RoW, construction camp/equipment yards and permanent areas for spoil disposal;*
- *Landslips and other mass movements in road cuts during construction activities; erosion from fresh road cuts and fills, sedimentation of natural drainage ways;*
- *Declined water quality and increased sedimentation in the areas near surface water bodies;*
- *Impact of construction activities on aquatic ecosystems of the rivers/ streams crossed by the highway;*
- *Soil contamination (RoW, equipment yards, cement/asphalt plants- in*
- *case used) during construction by oil/fuel, paint spills, waste;*
- *Impact on soil during operation;*
- *Waste disposal (construction camps and work sites), including waste water and waste alongside the RoW;*
- *Poaching by construction workers;*
- *Impact on cultural heritage - risks of uncovering archaeological material during excavation works;*

- *Heath hazards – noise, air emissions, dust – during construction and operation;*
- *Safety risks – hazardous driving conditions where construction interferes with pre-existing roads, accident risks associated with traffic and transport;*
- *Socioeconomic impacts - loss of business by roadside vendors; land acquisition/compensation (roadside commercial, orchards, non-motorized transport, etc)*

7.2 Specific Environmental Impacts

Under the specific environmental impacts reviewed in this chapter we mean most typical and significant impacts characteristic particularly for road projects. While the overall summary of project impacts is given in p. 7.1 and more generic impacts associated with the construction activities are described in p. 7.3, here we focus on those particular issues, which are more specific for road projects and some of them require not only qualitative but also quantitative analysis.

7.2.1 Air Emissions Related to Construction Activities and Operation of Highway

The major air quality issue during road construction is the production of dust during earthworks, storage and transportation of soil or other fine-grained materials (cement, sand, etc.), and vehicles moving across unpaved or dusty surfaces. Dust is also emitted during the production of concrete, especially if good production practice for dust emissions mitigation is not followed. It is very difficult to accurately quantify dust emissions arising from construction activities. It is thus not possible to easily predict changes to dust soiling rates. Therefore it is necessary to determine the likelihood of a significant impact which should be combined with an assessment of the proposed mitigation measures, such as the following:

- *Spray all unpaved roads and significant areas of uncovered soil with water every four hours on working days, during dry and windy weather;*
- *Provide a wheel-washing facility and ensure that it is used by all vehicles before leaving all sites;*
- *Cover all loose material with tarpaulins when transported off-site on trucks;*
- *Keep at least 300 m distance from residences windward to reinforced concrete production plants.*

Air quality during road construction is reduced by emissions from construction machinery and heavy goods vehicles used for materials transportation, though it is strongly recommended to ensure appropriate technical service for the traffic fleet used in road construction.

Ranking of impact is given in Section 9.3.

7.2.1.1Air pollution impact assessment: road operation

Amounts of vehicle emitted pollutants mainly depend on the technical condition of the vehicles, fuel quality and speed. Older vehicles usually have lower fuel consumption efficiency and cause higher emissions of combustion by products. Increasing speed of the vehicle demands higher fuel supply and therefore results in larger amounts of emitted pollutants.

Lower speed results in lower emission levels but at the same time it prolongs pollution dispersion. Increased traffic flow, low speed and low quality pavement would possibly impair ambient air quality along the route.

The impact related to the emissions in the atmospheric air and relevant mitigation measures are among the important issues typical to the road projects.

Ambient Air Pollution from the Intensity of Traffic within Rehabilitation of Tbilisi-Rustavi Connecting Highway

The hourly intensity of traffic within Tbilisi-Rustavi highway rehabilitation according to observation data in 2011 is characterized with the below parameters: cars - 507 units; minibuses - 201 units; autobuses - 21 units and trucks - 18 units;
According to 2016 estimates, intensity of traffic was assessed with the following parameters: cars - 724 units; minibuses - 286 units; autobuses - 30 units and trucks - 25 units;
Air quality modeling was completed on the basis of calculated dispersion data [2] for pollutant substances within 1000 m section (calculation step – 25 m). The analysis of the results shows that standards are not exceeded in control points (nearest populated areas – 7 points) and the graphical and table data of these results are given below. (Numbers imply maximum permissible concentration shares).

CONCLUSIONS:

No specific air pollution mitigation measures are recommended for Phonichala-Rustavi local road section; however it is advised to keep proper planning of greenery near settled areas. Values of ambient air pollution caused by the existing and perspective intensity of motor traffic within Tbilisi-Rustavi connecting highway rehabilitation will not exceed the standards

7.2.2 Noise Factor Related to Construction and Operation of the Road

Noise and vibration impact assessment: road construction Road construction will introduce additional noise sources to the local area. Road construction noise is caused by construction equipment and operations, i.e., there are two main sources of noise during the construction: noise resulting from road upgrading works, and noise from additional activities, such as transport of materials by heavy trucks along the route. The dominant source of noise from most construction equipment is the engine, usually a diesel, without sufficient muffling. Only in a few cases noise generated by the process dominates (for example, impact pile driving, pavement breaking, etc.). Noise levels during the construction will vary depending on the construction activity and schedule. Noise levels from the main road construction equipment and operations are presented in Table 7.1.

Modeling of Noise Related to Construction Activities

Evaluation of construction related noise relies upon known information on the noise produced by various equipment and activities at individual stages of construction. For example noise levels produced at 50 ft (15.24m) as provided by the U.S. Department of Transportation, FHWA, CADOT, and SBAG 1993; and Country Sanitation Districts of Los Angeles County 1994 are about:

Table 7.1 Construction equipment noise emission levels

Equipment Typical	noise level (dBA) approximately 15 m from source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Derrick crane	88
Bulldozer	85
Grader	85
Jack hammer	88
Paver	89
Pile-driver (impact)	101
Pile-driver (sonic)	96
Pneumatic tool	85
Truck	88

Table 7.2 noise levels provided by the U.S. Department of Transportation

Source of Noise	Equivalent noise level, dBA
Construction machinery and mechanisms	
backhoes	84 - 85
bulldozers	84 - 85
graders	91 - 92
compressors	80 - 88
jackhammers	85 - 98
pile drivers	96 - 107

Note: According to other sources (U.S. Environmental Protection Agency, 1972,):

7.3 Noise levels provided by the U.S. Department of Transportation

Source of Noise	Equivalent noise level, dBA
Construction machinery and mechanisms	
Compacters (rollers)	72 - 75
Front loaders	72 - 83
backhoes	72 - 92
Tractors	78 - 95
Scrapers, graders	80 - 95
Pavers	85 - 88
Trucks	83 - 93
Compressors	75 - 88
crane, movable	75 - 85
Jackhammers and rock drills	82 - 98
Vibrator	70 - 82
Saws	72 - 82

Noise and vibrations will be inevitable from such activities as digging trenches, soil compaction, breaking of the old road pavement by hydraulic hammer and other. According to the data presented in Table 7.5, frequent exceedances of acceptable noise levels resulting from construction activities are anticipated. Increased HGV movement along the route during the construction will be low as compared to the existing traffic flows and will cause no noise-related disturbance.

The Decree # 234n (Ministry of Health and Social Welfare of Georgia, Oct. 6, 2003) defines minimum distances for various construction related activities from „sanitation zones, to protect human health from the impacts of noise and vibration:

- Borrow pits (Art. 32) > 100 m;
- Asphalt plants (Art. 34) > 500 m;
- Reinforced concrete production (art. 35) > 300 m;

Noise generated by mobile sources naturally attenuates at a certain distance. Attenuation follows logarithmic pattern. In case of construction related noise, point source propagation model should be applied. Point-source propagation can be defined as follows: Sound level1 – Sound level2 = 20 log r2/r1. This means that for every doubling of distance, the sound level decreases by 6dBA ("inverse square law").

Table 7.4

Distance from the Edge of the Road m	**Predicted Noise Level Average Value - dBa**	**Predicted Noise Level Maximum Value - dBa**
5	80	90
10	74	84
20	68	78
40	62	72
80	56	66
160	50	60
320	44	54

Summary

The present and anticipated noise levels along the road are insignificant. Actually, in 40-50 m from the highway the noise level is acceptable without any mitigation measures.

Operation Phase

Emission impacts related to current conditions of traffic. The noise from the line source spreads out in case of continuous traffic flow. If the line noise source is combined with the point source, the sound waves spread out in a cylindrical or semi-cylindrical pattern. The noise spread forecast from the line source is as follows: Noise Level 1 – Noise Level 2 = 10 log r2/r1. The sound level of a line source reduces at a rate of 3 dBA for each doubling of distance. We should consider the traffic flow on a busy highway as a "line source" and take into account 3 dBA reduction for each doubling of distance.

The semi-quantitative assessment of the present and anticipated traffic noise impact is based on the noise measurements.

7.5 Table **Anticipated Noise Levels**.

Distance from the Road edge	Anticipated Noise (average) dBa	Anticipated Noise (maximum) dBa
5	65	78
10	62	75
20	59	71
40	56	68

The traffic noise will not spread farther than 5-10m from the road edge. The noise level is acceptable. Despite the anticipated increase of traffic volume, no worrying rise of the noise level is expected until 2030.

7.4 Potential Impacts Related To the Construction Activities

7.4.1 Pollution and Waste

Improper handling, storage, use and disposal of construction materials and wastes could pose a risk of water/ soil contamination at the construction site and storage site. Improper maintenance and fuelling of equipment could also lead to the potential contamination of soil/ water.

7.4.1.1 Construction Related Wastes

Various wastes will be produced throughout the construction process. The main waste producing areas are: construction sites. Small amounts of waste are expected along the access and heavy equipment movement routes with ground and soil pollution.

Waste Classification

During the construction of the local road the following types of waste will be produced:

1. Hazardous waste;

2. Non-hazardous waste;

3. Construction waste

Inert Waste

The road construction mainly produces inert construction waste, excavated soil, loose rock and debris – construction materials which have not been used and need to be disposed. The total amount of inert waste produced during the construction of the road section is less compared with the other road sections.

The inert waste disposal areas will be selected by the contractor and agreed with the local authorities.

Hazardous Industrial Waste

- Polluted soil;
- Polluted rags and oil absorbing fabric;

- Polluted water;
- Polluted industrial equipment in disrepair;
- Paint vessels and brushes;
- Lubricant vessels;
- Empty vessels of packaging;
- Polluted personal safety equipment and clothing.

Table 7.4 Types and Estimated Quantities of Waste

Waste Type	**Waste Category**	**Estimated Quantities (with unit of Measurement)**	**Waste Management**	**Alternatives**	**Responsibility Issue(s)**
Domestic waste	Non-hazardous	80-100 m^3 annually	to be transferred to the Contractor for disposal	Waste can be separated on site and some of it (paper, glass, plastic) can be transferred to the Contractor for recycling or reuse.	Contractor
Sewage	Hazardous	1500 m^3 annually	Sewage is discharged into the sewer network based on the contracts		Contractor
Damaged or outdated tools	Non-hazardous	1-2m^3 annually	to be transferred to the contractor for disposal		Contractor
Personal protection and clothes	Non-hazardous	1 m^3	to be transferred to the contractor for disposal		Contractor
oil soaked rags and absorbents	hazardous	The quantities depend on the oil spill scale 1m^3 annually	to be collected in plastic or metal containers and temporarily stored	1. to be transferred to the contractor for incineration 2. to be transferred to the contractor for storage	Contractor
Cut trees	Non-hazardous		to be transferred to the local authorities	to be transferred to kindergartens and schools	Contractor

7.4.1.2 Soil Pollution

Potential pollutants from a project of this nature include the following:

- Diesel fuel, lubrication oils and hydraulic fluids, antifreeze, etc. from construction vehicles and machinery
- Miscellaneous pollutants (e.g. asphalt, cement and concrete)
- Construction wastes (packaging, stones and gravel, cement and concrete residue, wood, etc.)

Extremely small amount of hazardous wastes (e.g. waste oils, oily rags, spent filters, contaminated soil, etc.) constituting about 0.1% of total amount of the wastes.

7.4.1.3 Surface Water and Groundwater Pollution

Water pollution may result from a variety of sources, including the following:

- Spillages of fuel, oil or other hazardous substance, especially during refueling
- Silt suspended in runoff waters ("construction water")
- Washing of vehicles or equipment or disturbance of watercourse banks and bed during water course crossings by heavy machinery
- Exposure of contaminated land and groundwater

Spillages etc. may travel quickly downhill to a watercourse or water body. Once in a watercourse, it can be difficult to contain the pollution which can then impact over a wide area downstream. It is therefore vital that prompt action is taken in the event of any potential water pollution incident.

Once the working width has been stripped of topsoil, the subsoil becomes exposed. During Earth works in a wet weather this may result in uncontrolled release of suspended solids from the work area.

7.4.1.4 Biological Recontamination

Recontamination by infectious biological materials (e.g. Anthrax) is a potential threat during earth works near the pest holes (i.e. not registered Anthrax sites). The risks are related to the fact that a large amount of the spontaneous burial sites is not registered by the relevant authorities.

7.4.1.5 Topsoil losses due to topsoil stripping

- Topsoil washout due to improper storage and reinstatement
- Silt runoff to watercourses and water bodies

Exposure of contaminated land

7.4.2 Impacts on Flora

The design area is located in the urban and adjacent transformed landscape. There are no protected territories, wetlands, forests or other sensitive habitats and ecosystems. However, potential negative impact on vegetation should be taken into account.

The design implementation envisages cutting of about 57 trees in the widened road sections. The vegetation mainly comprises a green belt along the road. However, there are some species listed in the Red List of Georgia and some endangered species in the project area. Detailed botanical studies showed that one variety is listed in the Red List of Georgia, namely the Field Elm (Ulmus minor Mill, 11 Elm are included *in 57 cut trees*). The number of cutting trees might be increased due to Resettlement Action Plan (orchards, private lands).

7.4.3 Impact on Fauna

Flora and fauna impact assessment: road construction

Flora and fauna impact assessment: some direct impact on flora is expected during construction of the highway (cutting 57 trees, which include 11 Field Elm in Georgian Red List). Indirect impact can be related to dust and exhaust emissions from traffic and contamination via contaminated runoff from the road. Main impacts on fauna during operation in general may include:

- Removal of roadside vegetation;
- Soil compaction, sealing of soil surface;
- Death of animals caused by road mortality;
- Higher levels of disturbance and stress, including that related to noise;
- Reduction or loss of habitat;
- Barrier effect, reduced connectivity;
- Subdivision and isolation of habitats and resources, breaking up of populations;
- Reduction of habitat below required minimal areas, loss of species, reduction of biodiversity;
- Indirect impact from dust, particles; oil, fuel, etc.
- Impact of water pollution on aquatic life;

Generally speaking the roads are considered as a barrier for some mammals, reptilians and amphibians, both during construction and operation. Other impacts associated with roads/highways are noise and vibration having potential to disturb land and avian species. Dust is generally considered as an impact worth mentioning. It is assumed that dust deposited on the plants in the road impact zone affects food base of the vertebrate and invertebrate species.

An immediate impact related to the construction and operation of roads is noise from construction equipment, and heavy traffic. Animals respond to noise pollution by altering activity patterns, and with an increase in heartbeat and production of stress hormones. Birds and other wildlife that communicate by auditory signals may be confused near the road construction sites.

Heavy metals, carbon dioxide, carbon monoxide and dust emitted during earthworks may all have cumulative effects. The contaminants may be carried far from roads by wind and runoff and add to the negative impact related to construction near/in the riverbed. Works within wet areas or on watercourses may negatively affect fish habitats and disturb riparian vegetation and soils that are essential to support aquatic habitats.

The construction impact will be temporary. The scale of impact may be reduced by means of organizing the works with due consideration of environmental safety requirements and mitigation measures recommended above.

7.4.4 Protected Areas

The design road does not lie in the vicinity of the protected territories.

7.4.5 Landscape

The project does not envisage any impact on the valuable natural landscape.

7.4.6 Water Use

Water will be required for maintenance works and for dust protection measures (water bowsers). The amount of required water is not high and the sources exist in the vicinity of the project sites (river Mtkvari; groundwater resources). No Water Intake Permit is needed for surface water intake, however special form should be filled to demonstrate that the terms of surface water intake (including indication of intake volumes) are in compliance with the Technical Regulations (Technical Regulations approved by the Order No 745 of MoE, issued on 13.11.2008). The agreed values (Limits) are determined for each particular facility in order to comply with the Sanitary Norms for surface water. Sanitary Norms for Surface Water is the generic regulation issued by the Ministry of Labour, Health and Social Protection, while the Discharge Limits are calculated for each polluter of the surface water objects.

7.4.7 Impacts on Archaeological Sites

Land clearance works, grading and excavations are associated with the risks of damaging underground archaeological remnants. There is no sufficient data on archaeological status of the project corridor. No aboveground monuments or known archaeological sites and visible signs of potential archaeological remnants have been identified during the baseline studies conducted by the IEE team. The not evaluated sites could be as sensitive as already known archaeological sites. During construction of the roads in Soviet times some archaeological artefacts have been destroyed. Therefore, special care should be taken not only at the new construction sites, but also at the sites where the existing motor road will be upgraded and widened. It should be understood that only undiscovered archaeological relics could be an issue and chance finds procedure proposed in chapter 8 is accepted as sufficient mitigation measure at the stage of planning.

7.4.8 Transport related impacts

Heavy trucks are required to deliver required amount of inert materials to the needed sites within the construction corridor. Selection of supplier is the prerogative of the construction contractor. However, the closest licensed quarries and borrow pits are located in the immediate vicinity to the highway and the highway is the main transportation route for delivering construction materials. No new access roads are required and the existing short access roads from quarries to the highway do not pass close to any of the settlements. Different types of impacts are anticipated in that regard:

- Noise & Vibration Impacts
- Traffic congestion (nuisance)
- Air pollution (dust; emissions)

- Mud on roads
- Re-fuelling, maintenance and vehicle cleaning and related risks of soil and water contamination

7.4.9 Traffic Disruption

Intensive runs of heavy trucks are required to deliver required amount of inert materials amount of materials to the needed sites within the construction corridor. The construction sites impose certain safety risks for the population and, therefore, compliance with safety rules is important. Local traffic can be impacted by transport activities related to the project. The mentioned impact is temporary, insignificant and manageable. Long-term impact on local traffic should be beneficial.

However, the main risk of the traffic disruption is related to the fact that the construction related to the widening of the road is to be carried out at the existing and functional road.

7.4.10 Quarry-related Impact

Heavy trucks are required to deliver required amount of inert materials to the needed sites within the construction corridor. Selection of supplier is the prerogative of the construction contractor. However, the closest licensed quarries and borrow pits are located in the immediate vicinity to the highway and the highway is the main transportation route for delivering construction materials. No new access roads are required and the existing short access roads from quarries to the highway do not pass close to any of the settlements.

So far as licensed quarries and borrow pits are supposed to be used by construction contractor, the limits for exploration and environmental requirements are fixed in license and expected impacts are mitigated by appropriate operations of the license-holder. The main requirement of this IEE in that case is to use only licensed suppliers of construction materials.

7.4.11 Construction Camp-related Impacts

The project does not include construction camp

7.4.12 Construction Related Impacts at the Concrete Plant and Gravel Crushing Facilities

The project does not include construction of Concrete Plant or Gravel Crushing Facilities.

7.4.13 Cumulative Environmental Effects

The cumulative effects of constructing the scheme must be considered in relation to main aspects, as described below.

The local road will be located within populated area and private land plots, and as a result construction of the scheme is predicted to give rise to a range of impacts, including socio-economic effects and impacts on air quality, noise and vibration, and landscape and etc. A residential property located adjacent to construction works may potentially, therefore, experience an increase in levels of noise and dust. Each of these impacts may not be significant on an individual basis, but cumulatively may have a significant effect on the amenity and use of that property.

In assessing the effects of the construction works on amenity, the following issues should be considered:

- socio-economic effects;
- impacts on traffic and transport;
- impacts on noise and vibration;
- impacts on air quality and dust; and
- impacts on landscape.

It has however been established that there may be a minor adverse level of significance with regards to soil, geology and contamination during the construction and operation phases. These receptors include site users and neighbors, surrounding land uses and surface waters. Other minor adverse cumulative effects during the operation phase include those to the landscape visual resources. Beneficial cumulative effects include those from traffic, namely minor beneficial effects for road users and sensitive populations, and moderate beneficial effects for transport users. The assessments have indicated that certain local receptors, such as vehicle travelers, pedestrians and residential properties may all experience a number of adverse environmental changes. Although the assessment of cumulative effects is complex, the outcomes of the individual discipline assessments should be used in conjunction with professional judgment to predict potential significant cumulative effects. Both developments are very different in nature and the proposed mitigation measures can be seen as beneficial to the other identified development, namely in terms of a reduction in traffic. Experience certain adverse environmental effects as a result of construction works and the permanent changes in land use and associated activities.

Overall some of these cumulative effects are considered to be minor adverse as they are of local significance.

8. MITIGATION & ENVIRONMENTAL MANAGEMENT PLAN

8.1 Mitigation Measures

8.1.1 Mitigation of Construction Related Impacts

8.1.1.1 Prevention and Mitigation of Geo-hazardous Processes

The design is prepared considering 8 degree seismic zone and is relevant to existing seismic risks.

There are no landslide prone areas or other high risk geological processes developed within the RoW.

8.1.1.2 Pollution Prevention Measures:

Water/ Soil Pollution. Specific mitigation measures should be implemented at the construction site for prevention of water and soil pollution:

Prevent operation of vehicles in the river and if there is no alternative, inspection of vehicles will be required to ensure that there is no leakage of fuel and lubricating materials.

Contractors will ensure the proper handling of lubricants, fuel and solvents. Fuel and lubricant storage tanks will not be located within 50m of any watercourse, well or dry gorges. All tanks will be placed in a bund of at least 110% of the tank's maximum capacity. If more than one tank is stored within the bund, the system must be capable of storing 110% of the biggest container's capacity or 25% of their total capacity, whichever is greater. The bund will be impermeable (e.g. concrete-lined), without drainage points or other breaches. Accumulated rainwater in bunds will be pumped out of the bund to either drains or the ground if uncontaminated. In case of fuel spillage the spilled fuel should be recollected and contaminated bund treated by the absorbents: sawdust, sand or straw.

All fuel / hydrocarbon dispensing nozzles are to be of a drip control design and securely locked when not in use.

No fuel storage or re-fuelling of vehicles or equipment will be allowed within 50m of any watercourse, water body, well, dry gorge or within any designated wetland area or aquifer. Vehicles will not be left without supervision during re-fuelling process. All re-fuelling operations on the working sites will use absorbent pads and/or straw to minimize spills, which will be put in place prior to the commencement of re-fuelling operations. Ground water and surface water pollution risk will be reduced or eliminated in case of immediate removal of polluted ground. Soiled ground and absorbents will be removed, stored and treated as hazardous waste. In case of significant spill authorized and responsible person will be informed, works will be stopped till the elimination of pollution risk re-fuelling will always be carried out with the correct equipment (i.e. nozzles of the appropriate size), and only by suitably trained and experienced re-fuelling Operators. Fuel supply equipment will be regularly revised to prevent leakage due to inappropriate condition of re-fuelling equipment. Equipment and storages will be isolated and guarded to prevent pollution due to cases of stealing or vandalism. All mobile plant, including

but not limited to cranes, compressors, generators, bulldozers, excavators etc. and storage tanks will be maintained and operated such that all leaks and spills of materials will be minimized. Daily plant checks (Vehicle Maintenance Procedure) will be undertaken to ensure no leaks or other problems are apparent. Vehicle maintenance, cleaning, degreasing etc. will be undertaken in designated areas of hard-standing, not over made unstable ground (embankments etc.). Water Tanks with sprinklers are envisaged for watering roads and machinery maintenance. Maintenance points will not be located within 50m of any watercourse, well or dry gorge. The storage of potentially polluting materials, re-fuelling and maintenance of mobile plant within 50m of all watercourses/water bodies, dry riverbeds and within designated wetlands and aquifers will be prohibited.

Erosion control measures will be applied during construction activities to prevent increased runoff into the watercourses.

Contractor will plan all excavations, topsoil and subsoil storage so as to reduce to a minimum any runoff. Contractors will be required to organize and cover material storage areas and to isolate wash down areas from watercourses by selecting areas that are not free draining into any watercourse.

Where any area of the spread is at risk from silt pollution washing off into a watercourse of water body, effective measures will be put in place to ensure that such pollution does not occur. Such measures may include

• Use of silt fences

• Use of straw bales to deflect and filter water

• Use of a system of bunds and grips to prevent water from entering watercourses, etc.

• Use of holding/settling lagoons to store water running off the spread. It is intended to use natural settling rather than flocculants to facilitate sedimentation following which clean water can be disposed.

Wet cement and/or concrete will not be allowed to enter any watercourse, pond or ditch.

Significant impacts on groundwater are not envisaged as any blasting operations and deep cuts are planned. Ground water pollution risk related to fuel leakages is minimal and will be eliminated in case of immediate removal of polluted ground.

Erosion control and pollution prevention measures are planned for the site of crossing the dry gorge with seasonal stream, in the area of planned bridge. Slope landscaping and vegetation are envisaged and in addition installation of temporary berms and sediment traps could be required, in case if during construction erosion will be stimulated. No fuelling operations will be allowed near the dry gorge.

8.1.1.3Construction Waste Management

Inert construction waste handling

Generally, it is recognized that the best option has always been the avoidance of waste generation resulting in minimizing the quantities and hazard. Then it is recognized that it is

better to reuse, restore and recycle the waste rather than to process it, and the placement is the last resort.

The total amount of inert waste produced during the construction of the aforementioned road section is less compared with the other sections construction.

Only some of excavated soil will be used for fills. At least 95,330 m^3 of excavated soil and loose rock should be placed in soil deposit areas. It is worthy of note that the designed road is located in the vicinity of non-functional Iagluja disposal area, which is due to be closed. It is recommended to transport inert construction waste (spoil) to Iagluja disposal area and use it for its closure and conservation.

Hazardous Construction Wastes

According to local legislation (Order #36/N of the Minister of Labour, Health and Social Protection of 24.02.2003) small amounts of listed types of hazardous wastes could be disposed on municipal landfills. Disposal of the most part of hazardous wastes should be agreed with the MoE and local authorities. Constructing Contractor shall collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at the temporary storage sites and further at the locations approved by MoE or pass it to the licensed operator (e.g. Sanitari Ltd), having environmental permit on operation of the hazardous wastes.

8.1.1.4 Noise, dust and emissions

The settlements are not affected significantly by the construction related emissions. However, emissions of heavy machinery involved in the construction should be managed by proper engine maintenance practice and usage of good quality fuel. The work of engines in a no-operation mode should be excluded.

Relatively high impact is connected with the dust emissions, which hardly can be quantified. However, it is obvious that the earth works and transportation of gravel and other inert materials from borrow-pits will impose nuisance related with dust. This is temporary impact, and should be mitigated by periodical watering of the work sites.

As a result of rough estimation of construction related noise, we can assume that the noise impact will not exceed radius of 80m.Temporary increase of the noise level near the construction ground within the 80-100m radius is acceptable impact The residential houses are not so densely concentrated near the road, except the end point (km 17.8) located in Rustavi entrance.

Mitigation of this minor impact is possible by engine maintenance practice and avoidance of engine work in non-operational mode. The only limitation that could be recommended is to deploy high noise devices, like crushers, outside the residential zone and exclude the night-time works.

All vehicles shall be maintained so that their noise and emissions do not cause nuisance to workers or local people. Near the settlements, the rehabilitation activities will be limited to daylight working hours to reduce impacts. All vehicles will be checked and repaired in case of need to eliminate increased level of noise due to damaged parts.

Regular maintenance of diesel engines will be undertaken to ensure that emissions are minimized, for example by cleaning fuel injectors. Routine maintenance will be to a high standard to ensure that vehicles are safe and that emissions and noise are minimized. All plant used on site will be regularly maintained so as to be in good working order at all times to minimize potentially polluting exhaust emissions.

Vehicle re-fuelling will be undertaken so as to avoid fugitive emissions of volatile organic compounds through the use of fuel nozzles and pumps and enclosed tanks (no open containers will be used to stored fuel).

If deemed necessary in dry conditions or where significant quantities of dust are being or are likely to be produced mitigation measures will be arranged with the Construction Manager. Mitigation measures will include:

- Damping down using water bowsers with spray bars or other technical means; Minimum 2 browsers will be required for that purpose. However, the constructing contractor should not be limited by this figure, and if required additional browsers should be engaged.
- Sheeting of construction materials and storage piles; and
- Use of defined haulage routes and reductions in vehicle speed where required. Materials will be transported to site in off peak hours.
- Materials transported to site will be covered/ wetted down to reduce dust. The construction site will be watered as appropriate. Protective equipment will be provided to workers as necessary. All vehicles will be checked and repaired in case of need to eliminate increased emission due to damaged parts.

Such measures will be used, where human or animal receptors lie within 300 m of the ROW.

8.1.1.5 Quarrying Sites and Borrow Pits

The closest licensed quarries and borrow pits are located in the immediate vicinity to the highway and the highway is the main transportation route for delivering construction materials. No new access roads are required and the existing short access roads from quarries to the highway do not pass close to any of the settlements. So far as licensed quarries and borrow pits are supposed to be used by construction contractor, the limits for exploration and environmental requirements are fixed in license and expected impacts are mitigated by appropriate operations of the license-holder. The main requirement of this IEE in that case is to use only licensed suppliers of construction materials. However, it is not excluded, that the construction contractor will prefer to obtain licenses for operating its own borrow pits and quarries, For that case this IEE provided general requirements to be met during the exploration of quarries and borrow pits.

Generally quarry sites are the major sources of environmental impact due to dust and noise pollution, loss of biodiversity, and generation of spills. Operation of the quarries above the approved limits may cause change of floodplain hydrology and trigger erosion and landscape degradation. The operating procedure for borrow pits shall consider following principles: (i) maximize the amount of fill that can be effectively used from the pit, (ii) minimize erosion and sedimentation, (iii) preserve the water quality of the rivers, (iv) protect air quality during

excavation, (v) prevent wildlife from falling into the pit, and (vi) reinstatement of the site after construction. Only approved borrow and quarry sites will be used by the contractors and produce copy of necessary government licenses to the client before procurement.

The mitigation plan to be followed by the Contractor at the borrow sites is: (i) only borrow areas approved by the environmental authority will be used for the project; (ii) pits management, (including restoration if it will follow the completion of certain works) shall be in full compliance with all applicable environmental standards and specifications; (iii) the excavation and restoration of borrow areas and their surroundings, in an environmentally sound manner to the satisfaction of the MoE and RD; (iv) borrow pit areas will be graded to ensure drainage and visual uniformity or to create permanent tanks/dams. Additional borrow pits, if necessary, will not be opened without the restoration of those areas no longer in use, and without the approval of MoE. Topsoil from the opening of borrow pits will be saved and reused to re-vegetate the pits to the satisfaction of the MoE.

General principles recommended for borrow pit and quarries management:

- Do not use borrow excavation until all suitable roadway excavation is used. Use select borrow and select topping as shown on the plans.
- It is accepted to used only licensed material suppliers
- Develop and restore Government located and provided borrow sources as approved by the Engineer.
- Do not excavate beyond the established limits.
- The borrow pit shall be landscaped after the excavation.

After the closure of the borrow pits, reinstatement and landscaping plan should be implemented by Construction Contractor.

Local roads will be damaged during transportation of borrow materials and by the construction equipment. In order to reduce impact on all borrow sites and local roads, contractors will water the local roads close to the settlements used by the borrow trucks and rehabilitate the local roads to their original conditions.

The measures aimed on mitigation of the dust and emission impacts, as well as potential river contamination due to improper fuelling and vehicle operation, should be the same as above described pollution prevention measures, but control on this sensitive site should be stricter. Road Department and Constructing Contractor’s environmental personnel should pay more attention to the quarrying site during monitoring.

The MoE and Environmental Inspectorate are in charge to control compliance of the quarrying company’s performance.

8.1.1.6 Topsoil Protection and Erosion Control Measures

Contractors will be encouraged to minimize usage of productive agricultural land and convert them to their original state after completion of civil works. Embankments should be monitored

during construction for signs of erosion; long-term material stockpiles will be covered to prevent wind erosion.

The storage of topsoil in stockpiles, no more than 2m high with side slopes at a maximum angle of 45^0, will take into consideration the following:

- Segregation of the topsoil from the subsoil stockpiles
- Dedicated storage locations that prevent the stockpiles being compacted by vehicle movements or contaminated by other materials;
- Segregation from subsoil stockpiles;
- No storage where there is a potential for flooding;
- No storage at less than 100 m from river/streams, subject to site specific topography

Contractor will protect the stockpiles from flooding and run-off by placing berms or equivalent around the outside where necessary. Topsoil stockpiles will be monitored and should any adverse conditions be identified corrective actions will include: (i) anaerobic conditions – turning the stockpile or creating ventilation holes through the stockpile; and (ii) erosion – temporary protective silt fencing will be erected;

Topsoil removed from the construction sites will be used for reinstatement of the topsoil on the embankments or in the adjacent construction corridor affected by the project activities. Topsoil will be reinstated separately from subsoil, with care taken to avoid mixing of the materials. The topsoil reinstatement will be sufficient to restore the fertile depth to the initial conditions as judged by the topsoil strip during visual observation and comparison of the reinstated site and adjacent land. When replacing the topsoil Contractor will program the works such that the areas farthest away from the stockpiles are reinstated first with reinstatement getting progressively closer to the stockpiles, thus reducing the number of vehicle movements over the reinstated topsoil. The reinstated topsoil will then be harrowed, where practical, to protect the stability and promote vegetative growth.

Subsoil Storage The storage of subsoil in stockpiles, no more than 3m high with side slopes at a maximum angle of 60^0, will take into consideration the following:

- Dedicated storage locations where the stockpiles will not be compacted by vehicle movements or contaminated by other materials; and
- Segregation from topsoil stockpiles.

In the event that the subsoil stockpiles experience significant erosion Contractor will institute corrective action such as installing erosion matting over the stockpiles.

Temporary Erosion Control Measures

The measures, by which Contractor will address the protection of “slopes” adjacent to the highway against erosion before permanent reinstatement, are outlined in this section.

Temporary erosion control measures will be introduced as necessary, paying special attention to:

- Construction activities that increase the potential for erosion from the slope sides and/or sediment mobilization in watercourses;
- Straw bale barriers in locations requiring small volumes of sediment interception;
- Temporary erosion control measures will be left in place until the slopes are stabilized to the approval of Road Department. The purpose of temporary erosion control measures is to:
- Interrupt surface water run-off;
- Slow the velocity of water runoff to the extent practical;
- Divert water off exposed check dam areas;
- Prevent and minimize sediment transportation off the construction sites.

8.1.1.7 Final Reinstatement and Long-term Anti-erosion Measures

All the work sites (except permanently occupied by the road and supporting facilities) should be reinstated to its initial conditions (relief, topsoil, vegetation cover). Replanting of bushes and trees is considered below in a section “Landscape Reinstatement and Protection of Flora”.

8.1.1.8 Landscape Reinstatement and Protection of Flora

The most part of the RoW belongs to strongly transformed urban landscape and has no ecological value. The project does not affect forestry fund land.

After Resettlement Action Plan approval the number cut trees might be increased due to orchards, which are on the private plots.

- Identification of trees to be cut and replanted.
- Avoidance of cutting and damaging of the trees without any special need. Preservation of vegetation as far as feasible.
- Each removed tree shall be compensated by planting and maintaining 3 trees nearby or after completion of works and re-cultivation of teritory

The places for re-planting should be done according to the MoE requirements (for the Red List with retio 1:10, for ordinary trees with retio 1:3), the places and saplings should be found according to the habitat, ground, climate, the value, and etc.

All these actions should be incorporated into the Construction Contract as part of the Environmental Management Plan.

8.1.1.9 Protection of Fauna

The project is not expected to have significant impact on the Fauna.

Noise, emission and dust minimization actions, as well as prevention of poaching by the workers should be included in the EMP as mitigation procedures.

The plants will be covered with dust, which will impact the feeding base and reproduction of vertebrate and invertebrate species (Яблоков, Остроумов 1985); the impact is limited to the territories in the immediate vicinity (adjacent to) of the road. Dust minimization measures as described above should be implemented (watering; covering fine materials etc.)

The following measures for mitigation of impact on the fauna are suggested:

- Special attention should be given to the avian fauna in the spring summer (April to July), the season most sensitive for birds;
- Noise and vibration level should be reduced by means of securing proper technical maintenance of machinery/vehicles, adherence to no horn policy, strictly keeping to the stationing/operation ground during the construction and operation;
- Dust reduction measures should apply, such as covering materials, removed topsoil and waste to avoid wind erosion and spreading around; restriction of the speed of trucks delivering materials to the construction ground, covering friable material with tarpaulin during transportation, avoiding high dumping of materials during unloading. If required, the ground (machinery stationing, camp site) should be watered to avoid generation of dust
- The fuel/oil storage should be equipped with adequate secondary containment (impermeable cover of the area, and the containment of sufficient capacity to avoid pollution of soil/water outside the berm and/or washing it off by the runoff);
- Spills should be immediately cleaned up to avoid spreading of pollution;
- Trenches or pits, if made, should be fenced or protected to avoid entrapping and injuries of the fauna species. Bright colored ribbons may be used for big animals (e.g. cattle), while metal plastic and other shields/fences may be used for small animals. If, despite of the mentioned precautions, small animals turn to be entrapped, upon completion of the shift, planks or medium size twigs must be made available for the animals to escape from the pits/trenches after the night. Pits and trenches must be checked prior to filling up.

8.1.1.10 Protection of the cultural heritage

Despite the fact that the project footprint is mostly limited to the existing road and construction sites are not located near any known subterranean monuments or areas of an archaeological interest, destruction of archaeological layers during the construction process is possible (although unlikely). To avoid this risk, archaeological supervision during the earth-works is necessary. Supervisory procedures and all other necessary measures should be agreed with

the Ministry of Culture when obtaining the construction permit, in accordance with the rules of the permit issuance. According to the article 14 of the Law on Cultural Heritage, Permit on conducting quarrying activities in Georgia, as well as construction of an object of a special importance as it may be defined under the legislation of Georgia, is issued by a competent authority based on the positive decision of the Ministry of Culture, Monument Protection and Sport of Georgia. The basis for the conclusion is the archaeological research of the proper territory to be carried out by the entity wishing to accomplish the ground works. The entity wishing to do the earth-works is obliged to submit the Ministry the documentation about the archaeological research of the territory in question. The preliminary research should include field research and laboratory works. In case of identifying an archaeological object on the territory to study, the conclusion of the archaeological research should contain the following information: (a) a thorough field study of the archaeological layers and objects identified on the study territory by using modern methodologies, (b) recommendations about the problem of conservation of the identified objects and planning of the building activity on the design territory, on the basis of the archaeological research. According to the established practice, the archaeological studies are conducted under the detailed design contract at the stage of obtaining the Construction Permit.

At the construction stage archaeological monitoring ("Chance Finds Procedure") should be ensured by the constructing contractor under the supervision of the Ministry of Culture, Monument Protection and Sport of Georgia. The budget necessary for the archaeological supervision and other agreed works should be fixed under the construction works appraisal.

Chance Finds Procedure:

Construction Contractor engages 1 especially dedicated archaeologist (archaeological supervisor) for conducting daily supervision activities during the earthwork operations. Good practice is to agree the candidature of person assigned for that task with the Ministry of Culture and Monument Protection.

The Ministry of Culture and Monument Protection may also assign a person or company for periodical supervision of construction works, although this is practiced only in exclusive cases of sensitive projects.

Archaeological supervisor conducts daily monitoring at all construction sites, where the earthworks (land clearance; grading; excavations etc.) are planned according to the schedule. Besides that, archaeological supervisor instructs the workers to report him immediately in case of any chance finding of potential archaeological relics.

In case of finding any artefacts of potential archaeological value, following steps are taken:

1. Construction workers are obliged to stop works and immediately report to the Archaeological Supervisor.

2. Archaeological supervisor reports to the Chief Engineer at site and requests to stop activities at the site of finding. Archaeological supervisor executes first checking of the finding and the site where finding was made

3. In case the finding has no potential archaeological value, the Archaeological Supervisor reports to the Chief Engineer and the works are restarted. Appropriate record regarding the case is made in record book.

4. In case if the finding is estimated as potential archaeological relic, the Archaeological Supervisor reports to Chief Engineer of the Construction Contractor and to MDF Environmental Specialist (and supervising company / Engineer) requesting to stop construction activities and to inform the Ministry of Culture and Monument Protection about the incident.

5. Chief Engineer of the Construction Contractor also reports to MDF informing about the stopped operations and requesting immediate engagement of the Ministry of Culture and Monument Protection.

6. Ministry of Culture and Monument Protection will assign expert or group of experts and conduct necessary archaeological works at the site to identify the problem.

7. In simpler cases, after removal of the movable artefacts, fixing materials and conducting other required works, the experts of the Ministry of Culture and Monument Protection will issue decision on recommencement of stopped construction works.

8. In exclusive cases of valuable and spatially spread findings, the Ministry of Culture and Monument Protection may issue request to relocate the RoW shifting it on a safe distance from the archaeological site.

8.1.1.11 Protection of the Infrastructural Elements

During the mobilization and preconstruction stage required activities are planned to remove the existing transmission lines, water supply pipelines and local gas pipelines to the safe sites. All of these infrastructural systems should be uninterruptedly functional during and after completion of construction activities. Permanent monitoring is required to avoid damage of the infrastructure systems, which are not removed. All the damaged systems should be reinstated. The complete list of the utilities and infrastructure to be relocated or affected specifically is provided in section 2.9 “Utility Relocation”.

Relocation, replacement and rerouting of all utilities located on the Project:

- The contractor is responsible for working closely with any utility company having their infrastructure located within the public right-of-way.
- Before any construction is begun the Contractor shall notify the utility companies of the proposed work area and request that they mark the location of any types of equipment in the area.
- The Contractor shall establish the position of existing services such as pipelines, sewers, surface water drains, cables for electricity and telephones, overhead lines and water mains, before starting any excavation or other work likely to damage them.
- The Contractor shall be responsible for arranging in liaison with the appropriate Authority, the moving of or alterations to services such as pipelines, power and telephone lines, water mains, sewers and surface water drains which are affected by the Works. The

arrangements for such moving or alteration shall be subject to the agreement of the Engineer and the appropriate Authority.

- The Contractor is responsible for any and all damage caused to any utility during construction and shall repair them with his equipment or, if the utility company desires, they shall be allowed a free use of his equipment and personnel as required in order to complete repair works.
- Should the utility company chose to repair the damaged utility themselves costs incurred shall be the responsibility of the Contractor.
- If any utility equipment is encountered in the proposed work area the Contractor shall submit to the Engineer for approval his proposal to relocate the utility outside the construction limits in writing. This proposal shall include, but not be limited to the proposed duration of the works, plans and details of a new utility route, materials to be used, together with any required certification that the material meets the utility company's specification and details of protection methods to be used for any utility materials to be left in place. After the utility has been rerouted the interested utility company shall be notified to inspect the work prior to commencing the backfill operation.

The affected infrastructure and the owners are listed in p. 2.9.

The main infrastructure to be crossed is the international mainline oil and gas pipelines operated by BP. Special design for crossing the RoW of the mentioned strategic pipelines has been elaborated by BP and Detailed Design contractor in close collaboration. The specific design complies international safety and engineering standards and BP has accepted this technical decision

The other affected infrastructure elements are of local significance and less complex. In consultation with the listed owners, the DD Contractor has elaborated specific relocation and design plan for each particular infrastructure system. Agreement has been achieved with all stakeholders. Safety and environmental issues have been considered, as all relocations are made for few meters, within the same environment. All these infrastructure elements are located within the low sensitivity environmental zones.

8.1.1.12 Health and Safety

It is required to observe safety measures, industrial sanitation and fire precaution measures and instructions whilst performing the works, as well as to train the staff. The Contractor is required to instruct the staff on safety measures prior to the commencement of works.

Road vehicles shall have small turning radius, equipped with sound signals and light signals which should be in good operating conditions. Parking place shall be fenced with barriers and equipped with red signals of emergency stop during the day and with red signal floodlight at night.

Roadmen shall be provided with special uniforms and special footwear. It is required to observe overall safety measures such as fencing of work site, various safety activities. The Contractor should ensure special shelter for protecting workers from unfavourable weather conditions.

Alternate access will be provided for vehicles and pedestrians. Appropriate lighting and signs will be employed.

The Contractor is responsible to perform the works in accordance with labour protection and safety requirements as well as industrial sanitation requirements.

8.1.1.13 Complex of Ancillary Facilities (Concrete Plant, Camp, Vehicle Fleet)

The current project does not include these facilities.

8.1.1.14 Resume

Commitment of Construction Contractor to adhere the environmental management requirements described in the present EIA should be incorporated into the contract (e.g. the present EIA or only EMP could be attached as annex and essential part of the contract).

The Constructing Contractor is obliged to assign environmental specialist for managing environmental issues and produce Contractor's Implementation Plan (based on the present EMP) with further description of details (schedule, involved personnel, required resources etc.).

The offset tree planting project (if required and as requested by MoE) should be elaborated by constructing contractor and relevant costs should be reflected in the overall construction budget. Offset tree planting Plan should be included in the final EMP (Contractor's Implementation Plan). The final version of the plan should be agreed with the Road Department

Only legally registered suppliers having all required permits and licenses will be used. This is relevant to the borrow pit operators, as well as to the other material suppliers. Checking of compliance with the permit and license requirements is the only way that the project may have influence and mitigate impacts related to the suppliers' operations. In case if the constructing company decides to explore borrow pits, appropriate licenses should be obtained from the MoE. The constructing contractor may take decision to install concrete mixing plants to produce concrete for their operations. In that case special EIA and obtaining of the Environmental Impact Permit is not required, however the contractor should be in compliance

8.1.2 Mitigation of Long-term and Operation Related Impacts

Here we would mention the mitigation measures to be implemented at operational stage. Most of these measures (predominantly maintenance works) should be implemented by Road Department utilizing funds from the state budget, lawns, grants and other financial sources.

Erosion and land stability control and landscaping. Road Department should ensure permanent erosion and land stability control and monitoring of landscape restoration after completion of construction works, as well as timely implementation of corrective actions. Corrective actions include, but are not limited to maintenance of drainage systems and implementation of anti-erosion measures (berms, vegetation cover etc.) whenever required.

Roadside litter and fuel pollution. RDMRDI should coordinate with the local Governmental institutions and private companies and facilitate arrangement and proper functionality of supporting facilities and services (fuelling stations, waste management services)

Air emissions, noise and pollution during the maintenance works. RDMRDI should ensure incorporation of environmental considerations in the maintenance contracts and monitor implementation.

Landscaping and planting of greenery. In a long-term perspective and in relation with the entire length of highway RDMRDI should plan development of the roadside zone applying proper landscaping and greenery planting strategies. Visual and aesthetic, as well as emission screening aspects should be taken into consideration. Prevention and mitigation of accident risks associated with vehicular traffic and transport that may result in spills of toxic materials injuries or loss of life Emergency preparedness. RDMRDI in conjunction with the Ministry of Interior (Department for Managing Emergency Situations) should facilitate development of legislation and emergency response plans regulating transportation of hazardous materials. The system of measures may include but not limited to:

- Design and implement safety measures and an emergency plan to contain damages from accidental spills.
- Designate special routes for hazardous materials transport.
- Regulation of transport of toxic materials to minimize danger.
- Prohibition of toxic waste transport through ecologically sensitive areas.

The abovementioned measures and plans should be elaborated in accordance with the Law of Georgia on Hazardous Substances and Regulations of the MoE on “Norms of Usage of Chemicals in the Environment and Rules of Transportation, Storage and Usage of Chemicals”. Regulations of other countries (e.g. Order of the Minister of Transport of Russia # 73 issued 08.08.1995 as amended in 1999) could be used as supporting materials.

Prevention of Proliferation of Human, Animal and Plant Diseases.

The Customs Services, the National Centre for the Disease Control and Medical Statistics (NCDC) and the “National Service for the Foodstuffs Safety, Veterinary and Plant Protection” of the Ministry of the Agriculture are responsible entities to prevent proliferation of human, animal and plant diseases due to transportation of people and goods.

Local Road Safety and Access roads for the local population:

Road accidents have a substantial impact on the community and this can be reduced through proper attention and incorporation of safety in the design. The MDF will ensure that all safety aspects of the road are integrated into the project design and implemented during the construction phase. Road accidents have a substantial impact on the pedestrian and community safety and can be reduced by good design and selection of appropriate design alternatives. The design will incorporate:

- Proper signs along the entire highway.

- New footpaths and pull-off bays in selected areas of the roads; e.g. through land plots; and other community facilities.
- Safety instructions for the construction activities in the contract documents.
- Sufficient visibility along the road section according to standard specifications.
- During the project additional road safety activities will be addressed through the Contractor's Safety Management Plan;
- Implement safety procedures to reduce the potential for road accidents in urban areas;
- People Safety: During operation, road safety features will include (i) measures to slow the traffic; e.g. installation of speed hump at selected places (e.g. settlements, etc), (ii) dust suppression sealing, (iii) improvements in road signage and pavement markings, and (iv) attention to road accident black spots

8.2 Monitoring and enforcement

Institutional Framework for EMP Implementation

The SEMP and monitoring program will be implemented by the Contractor during the construction period. Moreover, appropriate clauses will be included in civil works contracts to ensure the implementation of the SEMP.

Construction contractor is obligated to follow EMP and good construction practice. In order to meet this obligation, a contractor shall have at least one environmental specialist on the team, who is able to fully understand recommendations of EMP and professionally apply prescribed mitigation measures to the contractor's daily operations.

Technical supervisor14 of works commissioned by MDF is responsible to establish strong field presence in the Project area and keep a close eye on the course of works. Along with ensuring consistency with the design and ensuring quality of works, the supervisor is mandated to track implementation of EMP by the contractor, reveal any deviations from the prescribed actions, as well as identify any unexpected environmental issues should they emerge at any stage of works.

MDF provides a general oversight on the environmental compliance of works through ensuring quality performance of the technical supervisor and of the contractor. MDF also liaises with the ADB, ensures availability of all environmental information, and facilitates environmental supervision of the Project by the ADB.

Reporting on EMP Implementation

Contractor, through the environmental specialist on the team, shall prepare monthly status reports on the EMP implementation. Such reports must carry information on the main types of activities carried out within the reporting period, status of any clearances/permits/licenses which are required for carrying out such activities, mitigation measures applied, and any environmental issues emerged in relations with suppliers, local authorities, affected communities, etc. Contractor's monthly status reports shall be submitted to the technical supervisor and MDF.

Technical supervisor [2]prepares monthly reports on the status of EMP implementation and environmental performance of the contractor. These reports shall be based on the contractor's reports and carry analysis of their contents. Technical supervisor shall assess how accurate is the factual information provided in the contractor's reports, fill any gaps identified in them, and evaluate adequacy of mitigation measures applied by contractor. Technical supervisor must highlight any cases of incompliance with EMPs, inform on any acute issues brought up by contractor or revealed by supervisor himself, and propose corrective actions.

MDF must ensure that monthly reports from the contractor and from the technical supervisor are made available for the environmental specialists of the MDF promptly upon their arrival in MDF administration. The MDF, through its environmental specialists, shall report each semester (1 report per 6 months) to the ADB on the status of environmental compliance of construction works. Such reporting shall contain information on all violations identified and the actions taken for fixing of such cases. MDF shall inform the ADB on any major environmental issues at any time, independently from the schedule of regular reporting.

Remedies for EMP Violation

MDF, as a client of construction works, will be responsible for enforcing compliance of contractor with the terms of the contract, including adherence to the EMP. For minor infringements, an incident which causes temporary but reversible damage, the contractor will be given 48 hours to remedy the problem and to restore the environment. If restoration is done satisfactorily during this period, no further actions will be taken. If it is not done during this period, MDF will arrange for another contractor to do the restoration, and deduct the cost from the offending contractor's next payment. For major infringements, causing a long-term or irreversible damage, there will be a financial penalty up to 1% of the contract value in addition to the cost for restoration activities.

Institutional Capacity of MDF

MDF structure includes an environmental specialist, who is responsible for the control over the review of the environmental documents and accomplishment of the environmental procedures. Besides, MDF has a monitoring group with the function of implementation monitoring. The present institutional capacity of MDF is to be further extended to ensure the environmental compliance within the limits of the Project. Despite the fact that the work engineering supervisor will be charged with the daily control over the performance quality, the Road Department has to have proper staff to supervise the performance of the technical supervisor and make decisions to solve the problems brought up before MDF by the supervisor. For this purpose, it is necessary to organize the trainings for the MDF environmental specialist and monitoring group to master ADB safety procedures, and hire one more specialist to be responsible for the resettlement issues.

8.3 Costs of Implementation

The costs of environmental activities associated with the construction will be included in the contract for construction.

[2] Technical supervisor is part of the consulting service for construction management to be hired by MDF (CMC)

Additional archaeological studies may be required for obtaining Construction Permit. Possible need for financing these studies should be considered and negotiated with the Ministry of Culture and Monument Protection.

Some not significant expenses are foreseen with respect to the following public consultation on the EIA and EMP and will be borne by the MDF.

In case if the red-data tree species are damaged, compensatory planting of the species should be facilitated with the proportion of 1:10, so 10 trees should be planted instead of 1 cut tree.

#	Latin Name of Species	Amount	Amount of planted sapling	Price per Unit GEL		The Price GEL		Remarks
				From	To	From	To	
1	*Ulmus minor*	11	110	5	10	550 (1:10)	1100 (1:10)	Red Listed – conservational, status VU
2	*Pinus nigra*	18	54	8	25	432 (1:3)	1350 (1:3)	Artificial plantation
3	*Armeniaca vulgaris*	1	3	3	8	9 (1:3)	24 (1:3)	Artificial plantation
4	*Populus tremula*	1	3	3	8	9 (1:3)	24 (1:3)	Artificial plantation
5	*Sophora japonica*	5	15	3	8	45 (1:3)	120 (1:3)	Artificial plantation
6	*Elaeagnus angustifolia*	1	3	2	4	6 (1:3)	12 (1:3)	Artificial plantation
7	*Morus alba*	7	21	5	15	105 (1:3)	315 (1:3)	Artificial plantation
8	*Fraxinus sp*	13	39	5	25	195 (1:3)	975 (1:3)	Imported/decorative
9	**Total**	57	248			1351	3920	

The permanent expenses during construction are associated with the need to hire environmental and H&S specialists (In CMC budget, under the overall supervision contract). Related costs are approximately 60,000 Gel annually.

Trainings for MDF Environmental Specialist – 7000 GEL

8.4 Environmental Management Plan

Impacts	Sites	Mitigation Measures/Costs	Timeframe	Responsibility for Implementation	Responsibility for Monitoring
Destruction of natural landscape (relief, soil cover, vegetation, eco-systems, habitats and wildlife) in the Right-of-Way occupied by the highway. Activities: land clearance, topsoil stripping and excavations	Whole alignment of road to be widened	Sticks will be installed in pits and trenches for escaping small mammals. Proper top-soil storage practice, as described below, will be applied and stored topsoil will be used for reinstatement and landscaping; Compensatory planting of the red data tree species should be facilitated with the proportion of 1:10; Replanting of other trees as minimum with ratio 1:3	prior to start-up of land clearance Excavation period From land clearance – till reinstatement Develop planting plan before construction start up. Implement before completion	Constructing Contractor	MDF CMC Inspectorate of MoE
Destruction of natural landscape (relief, soil cover, vegetation, eco-systems, habitats and wildlife) on the access roads and etc.	Quarry sites; (e.g. Mtkvari floodplain). Waste dumps	In case of unavoidable impact on rare or protected species of flora, replanting program will be planned and executed; Sticks will be installed in pits and trenches for escaping small mammals Proper top-soil storage practice, height – 2m, slope 45^0, will be applied and stored topsoil will be used for reinstatement and landscaping; Landscaping plan will be developed and implemented;	prior to start-up of land clearance Excavation period From land clearance – till reinstatement After completion of civil works	Constructing Contractor	MDF CMC Inspectorate of MoE
Erosion stimulated from fresh road cuts and fills and temporary sedimentation of natural drainage ways. Erosion of lands below the road bed receiving concentrated outflow from covered or open	Along the whole section of the road	Permanent and temporary anti-erosion measures will be implemented according to the Detailed Design (temporary drainage, bio matting or geo -textile cover, berms etc.) For mitigation of sedimentation impact following measures will be implemented: - Limitation of earth moving to dry periods. - Protection of most susceptible soil surfaces with mulch.	Construction period	Constructing Contractor	MDF CMC Inspectorate of MoE

drains.		- Protection of drainage channels with berms, straw or fabric barriers. For mitigation of induced erosion following measures will be implemented: - Appropriate sized rain-storm-water channels will be constructed. - Drain outlets designed so as to avoid cascade effect. - Provision for cross drainage structures will be made. Water receiving surfaces to be lined with stones, concrete.			
Increased suspended sediment in streams affected by erosion at construction sites and fresh road cuts, fills and waste dumps. Declined water quality and increased sedimentation	Subsections close to the r. Mtkvari	Mitigation strategy: prevention through implementing temporary anti-erosion measures – temporary drainage, temporary sediment catchments etc. - Protect susceptible surfaces with r fabric, - Establishment of retention ponds to reduce sediment loads before water enters streams	Construction period	Constructing Contractor	MDF CMC Inspectorate of MoE
Topsoil losses due to improper storage and handling Earthworks will impact the fertile top soils that are enriched with nutrients required for plant growth or agricultural development Spoiled Soil storage	Whole alignment: the sections of road;	The Contractor shall - Strip the top soil to a depth of 15 cm and store in stock piles of height not exceeding 2m and with a slope of 45^0 - Spread the topsoil to maintain the physicochemical and biological activity of the soil. The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites - Topsoil stockpiles will be monitored and should any adverse conditions be identified corrective actions will include: • Anaerobic conditions - turning the stockpile or creating ventilation holes through the stockpile; • Erosion - temporary protective silt fencing will be	Construction period: starting from topsoil stripping and ending with reinstatement;	Constructing Contractor	MDF Inspectorate of MoE

		erected; • Spoiled Soil depot should be stored no more the 5m height, slope 45^0, at the approved territory			
Soil and surface water contamination by oil, lubricants, fuel and paint in the RoW, bridge sites and equipment yards caused by construction activities and operation of construction equipment; Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals and hazardous goods/materials on-site, and potential spills from these goods may harm the environment or health of construction workers.	Soil - the whole alignment; Rivers – Mtkvari Km 0 - 1	The Contractor shall - Prepare spill control procedures and submit the plan for approval. - Train the relevant construction personnel in handling of fuels and spill control procedures. - Store dangerous goods in bunded areas on a top of a sealed plastic sheet minimum 100 m away from watercourses. Do not store any hazardous waste in the in the restricted areas, which include • within 500m from any residential areas, cultural or archaeological sites - All re-fuelling operations on the working sites will use absorbent pads and/or straw to minimize spills, which will be put in place prior to the commencement of refuelling operations. Ground water and surface water pollution risk will be reduced or eliminated in case of immediate removal of polluted ground. Soiled ground and absorbents will be removed, stored and treated as hazardous waste. In case of significant spill authorized and responsible person will be informed, works will be stopped till the elimination of pollution risk Refuelling will always be carried out with the correct equipment (i.e. nozzles of the appropriate size), and only by suitably trained and experienced Refuelling Operators.	Construction period	Constructing Contractor	MDF CMC Inspectorate of MoE
Construction waste generation alongside the RoW : - excess soil and rock, demolished structures, packaging	Construction sites	Agree with Jagluja landfill management and municipalities and transport the spoil (excessive rock and soil) to the landfill and use it to as cover material for closing the landfill. This is proposed actin. In more general terms: Assess	Mobilization stage Construction period	Constructing Contractor	MDF CMC Inspectorate of MoE

materials etc.)		and, if required, develop spoil and rock disposal plan Use spoil and excess rocks for construction of embankments and dike with riprap revetment. Provide for disposal facilities agreed with local municipalities; Allow local communities to utilize any excess rock, which may be left following reuse. Transport any further material to the nearest spoil disposal sites agreed with the municipal services. The main purpose is not to damage valuable landscapes or soil deposits and other ecological sensitivities Demolished metal constructions should be disposed as a scrap. The personnel involved in the handling of hazardous and non-hazardous waste will undergo specific training in: - Waste handling - Waste treatment; and - Waste storage. Burning of waste on any construction site is forbidden with the exception of stub and small branches from felled trees and bushes, which is better to be burned in order to avoid pest dissemination.			
Emission from Construction Vehicles & Equipment causing air pollution	The whole alignment	Emission levels of all construction vehicles & equipment will conform to Georgian emission standards. - Any crushing & concrete plants will be away from populated areas. - Adherence to engine maintenance schedules and standards & repair - All vehicles and plants shall be maintained so that their	Construction period	Constructing Contractor	MDF CMC

		emissions do not cause nuisance to workers or local people. - Regular maintenance of diesel engines will be undertaken to ensure that emissions are minimized, for example by cleaning fuel injectors. Routine maintenance will be to a high standard to ensure that vehicles are safe and that emissions are minimized. - Vehicle refueling will be undertaken so as to avoid fugitive emissions of volatile organic compounds through the use of fuel nozzles and pumps and enclosed tanks (no open containers will be used to stored fuel).			
Dust generation from construction sites, material stockpiles and access roads. Dust is a nuisance in the environment causing health impacts for workers and local population	The whole alignment	- All precautions to be taken to reduce dust level emissions from batching plants & portable crushers with spraying of water and containment measures. - During dry conditions material delivery vehicles and haul vehicles carrying sand and fill material will be covered with tarpaulin. The construction site and any local roads will be watered as appropriate. - Protective equipment to be provided to workers as necessary e.g. at quarries, stone crushers. - Use of defined haul routes and reductions in vehicle speed where required with appropriate traffic management planning - Sheeting of construction materials and storage piles; and	Construction period	Constructing Contractor	MDF CMC
Noise pollution from vehicle operation during construction in populated areas traversed by the highway, notably metropolitan areas or densely settled rural	The whole alignment	Install and maintain mufflers on equipment. Routine maintenance will be to a high standard to ensure that vehicles are safe and that emissions and noise are minimized. All plant used on site will be regularly maintained so as to be in good working order at all times to minimize noise. Prohibit night works near the settlements	Construction period	Constructing Contractor	MDF CMC

areas. Local noise.					
Infrastructure. The main infrastructure element that could be affected are: 1. power lines 2. Gas mainline and local supply pipelines 3. Optical fiber cable		**Protection of infrastructure.** Implement the individual relocation/reconstruction plan and design as agreed with the owners of infrastructure within the frames of Detailed Design. Replace the affected infrastructure elements • Relocation of overhead power lines within the right of way of the construction site: • Relocation of gas pipeline Permanent monitoring during construction. Full reinstatement in case of damage.	Preparatory works before the construction start up	Constructing Contractor	MDF CMC
Creation of temporary breeding habitats for mosquito vectors of disease e.g. sunny, stagnant pools of water. Creation of stagnant water bodies in borrow pits, quarries, etc. suited to mosquito breeding and other disease vectors.	The whole alignment	Remove all created pools till spring-time. Reinstate relief and landscape	Construction period	Constructing Contractor	MDF CMC
Health hazards by noise, air emissions and dust raised and blown by vehicles during construction activities.	near settlements	Dust control by application of watering. Use as minimum as 2 browsers; Noise control, installation of mufflers on equipment, daytime works;	Construction period	Constructing Contractor	MDF
Impacts on archaeological sites and	The whole alignment	Permanent monitoring during land clearance and excavation activities.	Before startup of construction;	Archaeologist from MoCM	MDF

remnants		Stoppage and suspension of construction activities in case of archaeological findings. Completion of required archaeological works before restarting construction activities. Conservation of remnants	Construction period	Constructing Contractor	CMC Archaeologist from MoCM
Biological recontamination during earthworks near pestholes of soil infections (e.g. anthrax);	The whole alignment	Permanent monitoring during land clearance and excavation activities. Stoppage and suspension of construction activities in case of burial site findings. Notification to the local division of Veterinary Department. Veterinary clearance before start up.	Construction period	Constructing Contractor	MDF CMC
Hazardous driving conditions where construction interferes with pre- existing roads	The whole alignment	Provide in design for proper markers and safety signs on roads, including lights. Instruct the drivers	Construction period	Constructing Contractor	MDF CMC
Final Reinstatement and Long-term Anti-erosion Measures	The whole alignment	All the work sites (except permanently occupied by the road and supporting facilities) should be reinstated to its initial conditions (relief, topsoil, vegetation cover). So far as very limited bush clearance is required for the highway upgrading, preservation of top-soil is sufficient for reinstating the natural grass vegetation cover as well		Constructing Contractor	MDF CMC
Tree cutting and Offset tree planting program.	Sensitive zones	Offset tree planting program should be agreed with the MoE and Rustavi Municipality. We propose to apply tree planting ratio 1:10 for felled Red Data tree species and ratio 1:3 for other (non-red data) tree species. Apply procedures for extracting Red List Species From Natural Environment and procedures for exclusion of the land plots from the Forestry Fund, where appropriate	Develop before construction start up. Implement before completion	Constructing Contractor	MDF CMC
Accident risks associated with vehicular traffic and transport that may result in spills of toxic materials, detonation of explosive load, injuries	The whole alignment	- Provide in design for proper markers and safety signs on roads, including lights. Instruct the drivers - Design and implement safety measures and an emergency plan to contain damages from accidental spills.		Constructing Contractor	MDF CMC

or loss of life, injuries or loss of life. Accidents due to construction related vehicles and heavy machinery or traffic interference with construction activities		- Designate special routes for hazardous materials transport. - Regulation of construction transport in terms of traffic interference. - Prohibition of toxic waste transport through ecologically sensitive areas and densely populated areas.			
Quarrying Sites Taking of Borrow and Quarry Materials for construction of embankments for road; Potential impact of the increased quarrying activities on Ichthyofauna, groundwater and landscape	presumably, r.Mtkvari floodplain	IEE proposes to use licensed quarries located in the vicinity to the project road (see chapter 2) In more general terms: Quarry and borrow pit materials will be obtained from existing operating sites with proper licenses & environmental clearances. Control of validity of licenses. (The license is given with description of exploration limits and reinstatement commitments). Measures will be taken to conserve top soil. At close of use the area to be reclaimed according to licensing conditions. Control of vehicle operations at quarry sites. Avoid traverse of watercourse. Exclude leakage of oil or fuel. Check the condition of vehicles	Construction period	Constructing Contractor	MDF CMC Inspectorate of MoE
Erosion from road cuts and fills and sedimentation of natural drainage ways. Erosion of lands below the road bed receiving concentrated outflow from covered or open drains. **Character of impact**: long term.	Whole alignment	Mitigation strategy: long term – remediation; reinstatement of relief and landscape; Installation of long-term drainage systems and anti-erosion structures. - reinstatement of relief, soil and vegetation cover - installation of long-term drainage system and permanent monitoring.; - Installation of sedimentation basins, seeding or planting of erodible surfaces as soon as possible	Construction stage; Maintenance after completion of construction	Constructing contractor RDMRDI in long-term perspective	RDMRDI Inspectorate of MoE

Change of relief, drainage patterns, land clearance, may cause gradual but stabile intensification of erosion		- Increase number of drain outlets. - Place drain outlets so as to avoid cascade effect. - Line receiving surface with stones, concrete. - Long-term monitoring and maintenance			
Landscape disfiguration by embankments and deep cuts, fills and quarries. Marred landscape (scars from rod cuts, induced landslides and slumps etc.).	New cut sites	- Maintenance and and/or restoration of roadside vegetation - Use an architectural design to 'blend with the landscape. - Replant disfigured surfaces.	Construction stage; Maintenance after completion of construction	Constructing contractor RDMRDI in long-term perspective	RDMRDI Inspectorate of MoE
Increased suspended sediment in streams affected by erosion at construction sites and fresh road cuts, fills and waste dumps. Declined water quality due to increased sedimentation. **Character of impact**: long term. Change of relief, drainage patterns, land clearance, may cause gradual but stabile intensification of erosion	Near the River Mtkvari	**Mitigation strategy:** long term – remediation; Reinstatement of relief and landscape; Long-term monitoring; Installation of long-term drainage systems and anti-erosion structures. Reinstatement of vegetation cover. Establishment of vegetative cover on erodible surfaces as soon as possible		Constructing contractor RDMRDI in long-term perspective	RDMRDI Inspectorate of MoE
Air pollution from mobile asphalt plants during maintenance works.	Whole alignment	Install and operate air pollution control equipment	During Maintenance Works	RDMRDI supervising works and Maintenance Contractor	MoE
Air pollution from vehicle operation, in	Whole	- Monitoring of air quality and traffic related emissions		MoE	

populated areas traversed by the highway, notably metropolitan areas or densely settled rural areas. Local dust.	alignment Most critical starting point is close to Phonichala	(including inspection of vehicle emissions) - Development of policy and regulations limiting traffic related emissions (regulations on fuel quality etc.) - Require adherence to engine maintenance schedules and standards (or use alternative fuels) to reduce air pollution. - Plant trees along the roadside to screen and smoothen emission impacts on the close located settlement		Constructing contractor RDMRDI in long-term perspective	
Noise pollution from vehicle operation, in populated areas traversed by the highway, notably metropolitan areas or densely settled rural areas	Whole alignment Most critical starting point is close to Phonichala	- High solid walls –wooden or stone/brick - Require adherence to engine maintenance schedules and standards - Plant trees along the roadside to screen and smoothen noise impacts on the close located settlement - Enhance public transportation and traffic management capability.		Maintenance contractor RDMRDI in long-term perspective	MoE
Roadside litter	Whole alignment	- Provide for disposal facilities. - Encourage anti-littering laws and regulations		Local Government authorities and RDMRDI provide facilities and Regional services of MoE tracks compliance with standards	RDMRDI Inspectorate of MoE
Creation of a new pathway for disease vectors affecting humans and animals. Creation of a transmission corridor for diseases, pests, weeds and other undesirable organisms		(not locally on the current project but in general, to control the whole highway		Customs Services, “Sanitary Supervision Inspection of the MLHSP”, and the “National Service for the Foodstuffs Safety, Veterinary and Plant Protection” of the Ministry of the	

				Agriculture	
Health hazards by dust raised and blown by vehicles.	Whole alignment	Impact is minimal on asphalt paved highway. Dust control by application of water	Operation period	RDMRD	RDMRD
Obstruction of access roads	Crossing of local roads	Proper Design of interchanges have mitigated this potential impact. See in RAP	Design stage	Constructing Contractor	RDMRD

8.5 Environmental Monitoring Plan (Matrix)

Construction Phase

Phase	**What?** (*parameter is to be monitored)*	**Where?** (is *the parameter to be monitored)*	**How?** (is the parameter to be monitored /type of monitoring equipment/?)	**When?** (*is the parameter to be monitored – frequency of measurement or continuously)*	**Why?** *(is the parameter to be monitored (reply is not obligatory))*	**Cost**	**Responsible Institution**
Material supply	Possession of official approval or valid operating license	Supplier of materials asphalt, cement and gravel)	Inspection	Before an agreement for the supply of materials is formalized	Assure compliance with HSE requirements	N/A	MDF Supervising Agency (CMC)
Material transport according to the schedule and routes defined for deliveries	Truck loads covered/ wetted Air pollution due to the dust and fumes related to the Material Transport	Construction site and access road	Supervision	Unannounced inspections during work hours	Assure compliance with HSE requirements. Ensure safety, and minimize traffic disruption.	Minimal Included in supervision contracts	MDF CMC
Top-soil stripping stage. Final reinstatement.	Top-soil storage. Reinstatement. Erosion control. Landscape destruction; Visual impacts	Construction site	Supervision	Periodic (Unannounced inspections during work hours); From top-soil stripping – to completion of the works.	Assure compliance with, construction standards, environmental norms and EMP provisions;	Minimal Included in supervision contracts	MDF CMC
Construction work	Noise levels; Equipment;	Construction site	Inspection; compliance monitoring (engine maintenance, usage of mufflers, night time work limitations and other provisions of EMP.) noise measuring device	Periodic (average once per month); Only in case of complaints	Assure compliance with HSE requirements. Good condition of standard construction machinery and limiting the works near settlements to the site-related works is the only way for efficient noise control	Minimal Included in supervision contracts	MDF CMC MoE

Construction work	Vibration	Construction site	Supervision	Unannounced inspections; following complaints	Assure compliance with HSE requirements.	Minimal Included in supervision contracts	Constructing Contractor CMC
Construction work	Dust and Air pollution (solid particles, suspended solids, flying heavy metal particles)	At or near construction site	Visually	During material delivery and periodically in dry periods during construction	Assure compliance with HSE requirement, Assure compliance with, environmental norms and EMP provisions	Minimal Included in supervision contracts	Constructing Contractor RDMRDI CMC
Whole construction period.	Traffic safety/ Vehicle/ pedestrian access Visibility/appropriate signs	Construction site	Observation	Once per week in the evening	Assure compliance	Minimal Included in supervision contracts	Constructing Contractor; MDF CMC
Whole construction period.	Material and waste storage, handling, use Water and soil quality (suspended solids, oils, etc.)	Material and waste storage sites; Run off from site; material storage areas; wash down areas	Observation	During material delivery and periodically during construction (average 1/week), especially during precipitation (rain/ snow/ etc.).	Assure pollution abatement; Assure compliance with, construction standards, environmental norms and EMP provisions;	Minimal Included in supervision contracts	Constructing Contractor; MDF; CMC
Whole construction period.	Waste Management	All construction sites; Camps;	Observation	Once per week	Assure pollution abatement; Assure compliance with, construction standards, environmental norms and EMP provisions;	Minimal Included in supervision contracts	Constructing Contractor; MDF; CMC
Whole construction period.	Equipment maintenance and fuelling Water and soil quality (suspended solids, oils, fuel, etc.)	Refueling and equipment maintenance facilities; Run off from site; material storage areas	Observation	During material delivery and periodically during construction (average 1/week), especially during precipitation (rain/ snow/ etc.).	Assure pollution abatement	Minimal Included in supervision contracts	Constructing Contractor; MDF; CMC
Whole construction period.	Impacts on archaeological sites and remnants	All earthwork sites	Observation	Permanent/daily	Assure cultural heritage protection	Minimal	CAS represent. Constructing Contractor; CMC
Whole construction period.	biological recontamination during earthworks near pestholes	All earthwork sites	Observation	Permanent/daily	Assure health protection	Minimal Included in supervision contracts	Construction Field officer; MDF CMC

	of soil infections (e.g. anthrax);						Veterinary Department of the NSFSVPP
Whole construction period.	Protection of infrastructure elements	Crossings of power lines, pipelines;	Observation	During construction activities at the sites of concern	Assure infrastructure protection	Minimal Included in supervision contracts	Constructing Contractor MDF CMC
During Construction period	offset tree planting Program	Sites adjacent to the SZ 1 and 3	Observation	During Construction period	Assure offset of damage to flora and landscape	Minimal Included in supervision contracts	Constructing Contractor; MDF CMC MoE
During Construction period	Reinstatement of work sites	work sites, road alignment, used quarries, camp sites	Observation	During Construction period, after completion of works at concrete site	Reinstatement of work sites not taken by RoW		Constructing Contractor; MDF CMC
During Construction period	Disposal of construction wastes	work sites, road alignment, used quarries, camp sites	Observation	During Construction period, after completion of works at concrete site	Ensure pollution prevention and landscape protection;		Constructing Contractor; MDF CMC
Constructing Contractor; MDF CMC	Personal Protective equipment. HSE issues Organization of traffic by-pass	Construction site	Inspection	Unannounced inspections during works	Assure compliance with HSE requirements	Minimal Included in supervision contracts	Constructing Contractor; MDF CMC

9. PUBLIC CONSULTATION PROCESS

9.1 Requirements for public disclosure and consultations

A. Legislation and regulations of Georgia

In April 2000 Georgia ratified Aarhus convention. This UNECE convention grants public rights regarding access to information, public participation and access to justice, in governmental decision-making processes on matters concerning the local, national and transboundary environment. It focuses on interactions between the public and public authorities.

The law of Georgia on Environmental Impact Permits (2008) states the procedures for consultation in the EIA/IEE process and defines timeline for public review and consulting, namely:

1. The project executor will conduct public review on the impact on environment before submission of the project to the governmental agency responsible for permission issuance (where activities require construction permission, public review must be conducted before beginning the second step of the permission procedures).

2. The project executor will publish the information on the planned activity after conducting of public review. The information will be published by the administrative territorial office (if any) of the region, where the activity is planned.

3. The announcement must contain the following information:

a) goal, title and place of the planned activity;

b) location of the agency where the interested subjects will be able to familiarize themselves with the documents associated with the activity (including reports on environmental impact);

c) the deadline for submittal of considerations;

d) the place and time for public review.

4. The executor will:

a) provide EIA hard copy and electronic version to the administrative agency, that issues permission one week after publication;

b) accept and consider written notes and considerations provided by citizens in 45 days after the date of evaluation publication;

c) conduct public review of the planned activity no later than in 60 days after the publication of the announcement;

d) invite corresponding local self – administration and governmental agencies representatives; the Ministry of the Environmental Protection and the Ministry of Economical Development and other involved administrative agencies to the public review;

5. Reviews will be conducted in a public way and any citizen will be able to attend.

6. Public review will be conducted at the region administrative center, where the activity is planned.

According to the article 7 of the law, 5 days after conducting the public disclosure meeting, the minutes of the meeting should be prepared to reflect all the questions and comments raised and explanations provided by the project proponents in response. Appropriate corrections should be incorporated into the main text of the EIA, as required. If the comments and proposals of stakeholders are not accepted the letter of explanation should be sent to the concerned persons. The minutes of the meeting, as well as response letters, explanations and corrections should be submitted to the MoE or the administrative body responsible for issuing the Permit as supplementary materials to the EIA. The mentioned documents should be considered as an essential part of the EIA.

B ADB-requirement in relation with Public Consultations

(1) Basic Principles - ADB welcomes information provided by concerned organizations and stakeholders, so that it may consider a diverse range of opinions and information in its environmental reviews and supervision of projects. In order to encourage concerned organizations and stakeholders to provide information to ADB at an early stage and to ensure its accountability and transparency in the environmental review process, ADB makes available, important information on environmental reviews. This is done in ways appropriate to the nature of the project, and while the environmental review is in progress. ADB may also, when necessary, seek the opinions of concerned organizations and stakeholders.

In addition to the aforementioned principles, if requested by third parties, ADB will provide them with information regarding environmental and social considerations within its capacity to do so. ADB respects the confidentiality of the commercial and other matters of the borrowers and related parties, and observes concurrently the principles of information disclosure and such confidentiality.

(2) Timing of Disclosure and Content of Disclosed Information Prior to making decisions on funding and depending on the nature of the project, ADB discloses information in principle as indicated below. ADB endeavors to disclose information in a manner that allows enough time before decisions are made on funding i.e.

- Upon completion of the screening of a project, ADB discloses, as soon as possible, the project name, country, location, an outline and sector of the project, and its category classification, as well as the reasons for that classification; and
- For Category A and Category B projects, ADB publishes the status of major documents on environmental and social considerations by the borrowers and related parties, such as IEE or EIA reports, Executive Summary on the ADB website, and promptly makes available the EIA reports etc.

After executing a loan agreement, ADB provides the results of its environmental reviews of projects in Categories A, B and FI for public perusal on the ADB website.

ADB pays due consideration to the confidentiality of the commercial and other matters of the borrowers and related parties, taking into account their competitive relationships, and

encourages them to exclude such confidential information from any documents on environmental considerations submitted by them that may later be subject to public disclosure. Any information that is prohibited from public disclosure in the agreement between ADB and the borrower may be disclosed only with either the agreement of the borrowers and related parties or in accordance with legal requirements.

9.2 Status of Public Participation

The first draft IEE has been submitted to MDF who has in turn disclosed the report according to the requirements of Law on Environmental Impact Permits (2008). MDF as the executor of the project has arranged the public participation as per the Georgian procedures defined above.

The Public Consultation Meeting has been conducted in MDF office on 02 October 2014 (50 days later after the disclosure of the draft document and announcement regarding the planned meeting).

Information meeting with population regarding "Tbilisi-Rustavi highway construction (section 3, local roads) project"

October 2, 13:00 PM, 2014

Minutes of the meeting

Within the scope of Tbilisi-Rustavi highway construction (section 3, secondary roads) information meeting with population was held in MDF office on October 4, 2014. Aim of the meeting was to inform population regarding possible positive and negative impacts on environment during project implementation process and to propose adequate environmental and social protection measures in order to avoid or mitigate negative impacts.

Meeting was attended by: Tbilisi-Rustavi 3rd section secondary roads (access roads) adjacent land plots owners (list and signatures attached), MDF representatives: Advisor to Executive director Mr. Davit Tabidze, ADB consultant in resettlement issues Davit Arsenashvili, Environmental Safety Specialists: Nino Nadashvili, Ana Rukhadze and Nino Jangulashvili also supervisor company DOHVA's consultant Maia Vashakidze.

Meeting was opened by Nino Nadashvili. She welcomed attendants and provided brief information about project, its progress and further activities. Nino Nadashvili reminded attendants aim of the meeting and asked Maia Vashakidze to present main aspects of IEE .

Maia Vashakidze spoke about necessity of secondary road for the population and set a stress on environmental protection issues. She briefly described the possible impact that will occur during construction process. PWP presentation was accompanied to her speech which was observed by attendants. Project's general characteristics, civil works, possible negative, positive impacts on environment during construction process and possible environmental, social protection measures became obvious for population.

Maia Vashakidze explained what benefits secondary road construction can bring for population. She noted that construction of local roads will ease movement and will allow uninterrupted access to land plots from highway.

Among possible positive impacts were employment opportunities, fast and safe movement. Among negative possible impacts were air pollution due to heavy machinery operation, noise, ground and water contamination in case of leakage, spilling or improper management of harmful substances, impact on flora – that will require cutting of 57 trees on several parts of the project area, possible damage of utilities and etc.

On a meeting, population was provided with detailed information about planned mitigation measures, with respect to above mentioned possible negative impacts. In Particular dust control will be implemented for air quality protection, construction site and access road will be permanently watered, waste will be sorted as hazardous and nonhazardous waste, waste incineration will be prohibited and controlled strictly. Waste will be regularly disposed by licensed contractor, only registered transport facilities with proper permission will be utilized, speed limit will be determined for construction machinery, works producing noise will be prohibited during night time, 3 times more tree planting is planned instead of cut trees, and 10 times more - for the trees included in Red Book.

At the end of the presentation population was provided with information related to complaints and dispute resolution mechanism (GRM) which will be valid during project implementation. Before commencement of civil works committee of claims and dispute will be created were local population will be available to express their claims for proper resolution.

Following questions were asked by the attendants:

Will the irrigation channel, which is located along road, remain in the same condition or will it be covered? There is a flood danger in case of fast filling of channel. Is channel sides facing envisaged?	Nino Nadashvili explained that project is related to road construction and accordingly does not envisage channel reconstruction. Existing irrigation channel will remain in the same condition; no side facing or covering is envisaged. Though mentioned issues can be discussed with appropriate specialists and engineers and based on their opinion optimal solution can be made. Davit Tabidze also confirmed that existing issues will be discussed with appropriate specialists and all possibilities will be discussed and proper solution will be made only based on consultations. In case of necessity it is possible to develop new project for channel reconstruction.
How arising dust can be neutralized, which will have negative impact on vegetable gardens and fruit trees?	Nino Nadashvili noted that dust problem is existing from operating highway today as well. As for the dust arising during construction process, watering of construction site will be implemented permanently.

By whom is this project implemented and financed?	Project is implemented by MDF with ADB financing.
How restoration issue will be regulated, is it envisaged to plant new trees instead of cut trees and who will be responsible for saplings protection from withering?	Maia Vashakidze explained that some impact on flora is envisaged by the project. In particular approximately 57 trees can be cut off. Compensation activities are of course foreseen and on each cut tree 3 new tree planting is planned, for trees included in Red Book - 10 for each. As for taking care of planted trees it is local municipality and road department prerogative.
How compensation issues will be adjusted?	Mr. Davit Tabidze explained that compensation issue is confidential information and discussion will be held with each person individually. Calculation and reimbursement of compensation amount will be individual for each owner.
How water and gas supply issue will be adjusted? Is there a possibility of interruption?	Availability of water and gas supply for population will be ensured during project implementation process.

21 Participants of the meeting expressed gratitude for provided detailed information and positive attitude towards project implementation.

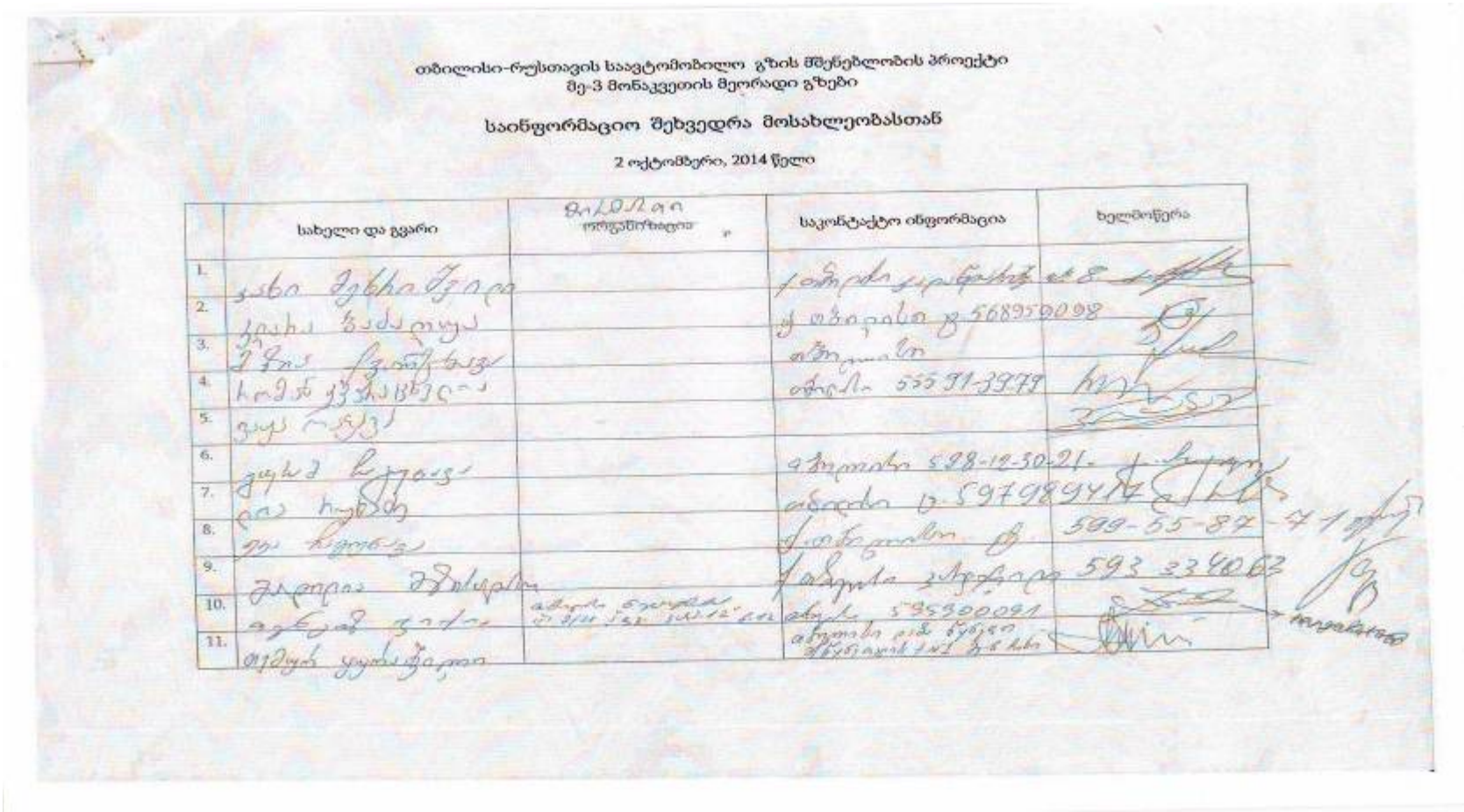
Information meeting with population regarding "Tbilisi-Rustavi highway construction (section 3, local roads) project"

October 2, 13:00 PM, 2014

List of Participants

#	Name	Address	Contact Information	Signature
1	Kakhi Meskhishvili	Tbilisi, Kandadze #8		
2	Klara Badzagua	Tbilisi	568 95 90 98	
3	Mzia Kvartskhava	Tbilisi		
4	Roman Kvaratskhelia	Tbilisi	555 91 39 79	
5	Vaja Raphava			
6	Guram Chagunava	Tbilisi	598 12 30 21	
7	Lia Rukhadze	Tbilisi	597 98 94 17	
8	Eka Chagunava	Tbilisi	599 55 87 71	
9	Gadilia Mzisadari	Tbilisi, Varketili	593 33 40 63	
10	Tengiz Jikia	Tbilisi, Nutsubidze 3 M/R 1 Block, 12 Building, #12 Flat	595 90 00 91	
11	Temur Kurashvili	Tbilisi, Tskneti, Tsereteli Str. 1, Blind Aley 6		
12	Vakhtang Machavariani	Tbilisi, Kazbegi Ave. 16	595 11 77 25	
13	Temur Dolidze	Tbilisi		
14	Grigol Oniani	Tbilisi, Lubliana Str. 2 Flat 21		

15	Malkhaz Nachkebia	Tbilisi, Tskhneti		
16	Ketevan Tabidze	Tbilisi, Politkovskaia 5	577 17 99 30	
17	L. Kalinina		599 22 00 45	
18	Kerasbediani		571 55 65 61	
19	Koba Kiladze		599 60 50 46	
20	Nugzar Kharadze		ID: 12003000247	
21	Jangulashvili Nino	MDF	595 07 04 44	



თბილისი-რუსთავის საავტომობილო გზის მშენებლობის პროექტი
მე-3 მონაკვეთის მეორადი გზები

საინფორმაციო შეხვედრა მოსახლეობასთან

2 ოქტომბერი, 2014 წელი

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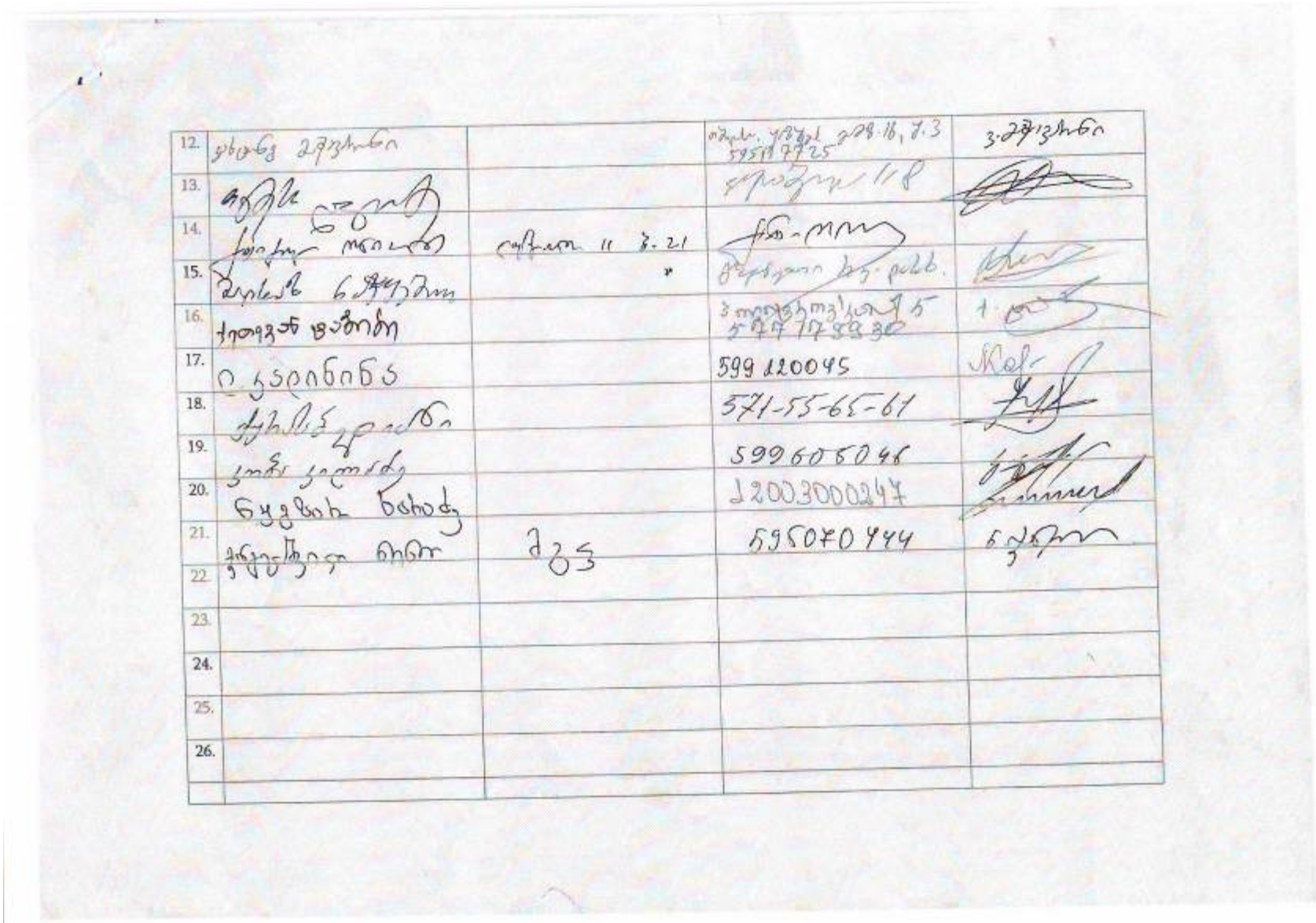

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10. GRIEVANCE REDRESS MECHANISM

During implementation of the Project, there might be several issues related to environmental hazards and disputes on entitlement processes will occur due to the Project activities. For example, intensive schedule of construction activities; inappropriate timing of construction vehicle flow; waste; noise and air pollution from construction activities; ecological disturbances; cultural conflicts between migrant workers, are some of the environmental issues that are likely to arise from the Project activities. A Grievance Redress mechanism will be set up for the Project to deal with both the environmental and social issues of the Project.

MDF has overall responsibility for project implementation and environmental compliance. The administrative bodies responsible for environmental protection are MoE and Tbilicy City and regional (Rustavi, Gardabani) municipal offices (gamgeoba). The affected population and stakeholders may send their grievances, related to the project-induced environmental impacts and nuisance to the Project Implementation Unit (PIU), represented by MDF, or directly to the administrative bodies responsible for environmental protection. CMC is used by MDF for verification of the cases described in received grievances and for routine communication with the affected local population. MDF will record all received grievances in a grievance book and supplement the initial information with the description of all corrective measures, further communication with the affected persons and final conclusion after completion of the grievance resolution cycle.

MoE, Rustavi Mayor/s Office and Gardabani Gamgeoba are obliged to respond to the grievances that have been received from population or other interested parties in accordance with the requirements of the Administrative Code of Georgia. MDF as the PIU will facilitate the response by implementing a project-specific GR procedure. During the public consultation process, MDF will inform stakeholders and the public that the MDF is responsible for environmental compliance and grievance redress. MDF will provide at the public consultation meetings and disclose on the MDF web-site the contact details of the persons responsible for grievance collection and response. Upon receiving a grievance (in written or oral communication) MDF will execute following actions:

(i) Send its representatives to check the claims and monitor the situation;

(ii) Involve MoE and local municipalities when and where appropriate;

(iii) Receive experts' conclusion (from MDF personnel, independent experts and/or MoE/City Hall experts);

(iv) Submit to the constructing company and operator an instruction regarding corrective measures;

(v) During 10 days after receiving the grievance, inform the affected person or persons about the expert's decision and applied corrective measures;

(vi) If the complainant is dissatisfied with the decision, they may present further information in support of their case. After considering the appeal and the supporting new information, the subsequent decision of the MDF/MoE and participating municipality is considered final.

At the conclusion of this process, if the affected stakeholder or person is not satisfied by the response of MDF or administrative bodies, the grievance may then be directed to the court.

In parallel the community is encouraged to submit their grievances directly to the ADB resident office in Tbilisi in order to enable ADB control the grievance resolution process from the early stages.

The affected persons are advised to provide their grievances in a format given below:

Complaints and Grievance Submission Form

<table>
<tr><td colspan="2">Region#</td></tr>
<tr><td colspan="2">Title of the Project</td></tr>
<tr><td>Name, Last name</td><td></td></tr>
<tr><td>Contact Information

Please indicate the preferable means of communication (Mail, Telephone, Email)</td><td>Mail (Please indicate the postal address):
_____
_____
_____
_____

Telephone:
_____

E-mail
_____</td></tr>
<tr><td>The language desirable for the communication</td><td>☐ Georgian
☐ English
☐ Russian</td></tr>
<tr><td colspan="2">Describe the grievance/claim: What is the complaint about? What is the claim?</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Date of Negotiation:</td><td>Resolution of Negotiation:</td></tr>
<tr><td></td><td></td></tr>
</table>

What is the basis of your claim?
Proposed Addresses for Submission of Grievance Forms
1. Ministry of Environment of Georgia Address: 6 Gulua str. 0114 Tbilisi, Georgia Fax: 2727237/ Phone: 2727200 2. Municipal Development Fund of Georgia Address: 150 David Agmashenebeli ave. 0112 Tbilisi, Georgia Tel: (99532) 2437001; 2437002; 2437003; 2437004 Fax: (99532)2437077 E-mail: mdf@mdf.org.ge 3. Asian Development Bank/ Resident Office in Georgia Address: 39A Chavchavadze Ave. 0162 Tbilisi, Georgia Tel: +995 322 250619 to 21 Fax: +995 322 250622. Contact Person: Tea Papuashvili e-mail: tpapuashvili@adb.org Phone: 2250619

11. CONCLUSIONS AND RECOMMENDATIONS

The present IEE reveals that there will be minor negative and tangible positive impacts due to the construction activities and normal operations of the road section. Recommendations are made to mitigate expected negative environmental impacts. The IEE and included EMP cover all environmental aspects of the Project road. The resettlement aspects are addressed separately in LARP.

The major positive outcomes of the Project will be safe driving conditions for transit motor transport flows and local residents, especially for the Phonichala-Rustavi section, and higher carrying capacity of the road. After the further sections of the road are designed and constructed, the capital of Georgia will be linked to Azerbaijan and its capital Baku through the modern road meeting the international standards. This road will be used to comfortably transport the cargo and passengers to Tbilisi and Black Sea ports. The design road is also very much important for the social-economic development of the population of Kvemo Kartli region, particularly for the population and industries in the city of Rustavi and Gardabani region. Many of 120000 residents of Rustavi work or study in Tbilisi.

In short term perspective, the project will also have some benefit for local population, providing job opportunities (about 100 new jobs could be available for local residents). The negative impact related to the construction nuisance (dust, emissions, noise) is temporary, insignificant and manageable by application good construction practices.

At this stage, it can be summarized, that this project will affect as minimum 164 households: 131 AHs are affected directly and 33 are the employees losing their jobs. Project impact is related to permanent take of 132 private land plots with total area of 98580 sqm. Out of this amount 30 are legalize and 102 with full registration. No crops are cultivated on the affected commercial land plots. Acquisition of only 5 land plots is associated with losses of 54 productive trees. The main impact is related to the loss of structures and businesses. In total 4 major structures and some ancillary facilities will be destroyed, including 1 car washing station, 3 petrol filling stations. 6 legal entities will suffer in terms of business impacts: permanent loss of business facilities According to the ADB SPS 2009 this sub-project is thus classified as of category A and needs the preparation of a Land Acquisition and Resettlement Plan (LARP).

The Land Acquisition and Resettlement Plan (LARP) will provide detailed census of affected households, inventory of loses, description of social status and identification of vulnerable groups. Compensation and rehabilitation plan will be elaborated upon completion of valuation of the lost assets. All the affected households will be provided with the adequate compensation according to the Georgian legislation and ADB SPS 2009 requirements. Vulnerable and severely affected households will be provided with the additional allowances.

Construction related potential impacts:

- Erosion from road cuts and fills and temporary sedimentation of natural drainage ways.
- Erosion of lands below the road bed receiving concentrated outflow from covered or open drains.

These impacts should be mitigated by anti-erosion measures: temporary drainage systems, berms, sediment catchment basins etc.

No sensitive ecological habitats are represented in the project area. However, XX amount of trees will be felled. Additional ecological studies are required prior to start-up of the construction operations, immediately after the demarcation of the construction corridor. The cadastral description of trees to be felled should be conducted within the demarcated corridor, all efforts should be made to avoid any individual tree of red data specie, the trees to be cut down should be marked. As minimum the same amount of trees should be planted under the landscaping and greenery plantation program. Compensatory planting of the red data tree species should be facilitated with the proportion of 1:10;

The waste and hazardous material handling, dust and emission control, traffic management, health and safety procedures and other common construction related activities should be managed according to good international construction practices.

All the work sites (except permanently occupied by the road and supporting facilities) should be reinstated to its initial conditions (relief, topsoil, vegetation cover).

The contractor will prepare a spoil and waste disposal plan in consultation with MoE and local municipalities and submit to MDF for approval. Filling materials will be provided from licensed Quarries and borrow pits.

Compliance to the environmental management plan during various phases will minimize the negative impacts of the Project to acceptable levels. To ensure that these plans and mitigation measures are implemented and negative impacts avoided, the EMP will be included in the contract documents of the Project with a separate line item on environmental management in the bills-of-quantities.

Environmental Consultants of Construction Supervision Consultants are responsible for monitoring of implementation of EMP and ensure compliance. Environmental Division of MDF is also responsible for supervision of construction works and compliance to EMP in coordination with supervision consultants and hiring of external/independent monitoring consultants.

The Project will have overall beneficial impact as well as some minor negative impacts that will be carefully monitored and adequately mitigated. Therefore, the completion of this IEE fully meets the MoE and ADB requirements and submitted to MoE to obtain EIP.