

# Initial Environmental Examination

---

Initial Environmental Examination 2  
Document Stage: Final  
Project Number: 42414

GEO: Sustainable Urban Transport Investment  
Program, Tranche 2 (Section-3: km 10.5 to 17.1  
Tbilisi – Phonichala)

Prepared by Ministry of Regional Development and Infrastructure under the Municipal  
Development Fund for the Asian Development Bank.

# Municipal Development Fund of Georgia



## Initial Environmental Examination

### *Section-3: Phonichala - Rustavi*

#### **Volume-1**

Engineering, Procurement, Construction Management and Supervision of  
the Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge  
(Azerbaijani Border) Road

Contract No: SUTIP/C/QCBS-3

*Funded by*  
**Asian Development Bank**  
**Loan: 2655-GEO**

Prepared by: Foundation WEG  
Prepared for:  
DOHWA Ltd / TRANSPROJECT Ltd  
Ministry of Regional Development and Infrastructure

**GEORGIA**

**2012**



**Korea**



**Georgia**



**Georgia**

## TABLE OF CONTENTS

	pp
1. INTRODUCTION .....	1
1.1 Background .....	1
1.2 Objectives .....	1
1.3 Methodology for IEE .....	1
2. DESCRIPTION OF THE PROJECT .....	2
2.1 Overview .....	2
2.2 Type and Category of Project .....	3
2.3 Need for Project .....	3
2.4 Location .....	4
2.5 Proposed Schedule for Implementation .....	6
2.6 Design Criteria and Parameters .....	6
2.7 Road Pavement Structure .....	8
2.8 Engineering Structures .....	9
2.9 Utility Relocation .....	17
2.10 Equipment Use During Construction .....	21
2.11 A complex of auxiliary building objects .....	22
2.12 Quarries .....	22
2.13 Traffic Management During Construction .....	24
3. GOVERNMENT POLICY LEGAL AND ADMINISTRATIVE FRAMEWORK ....	26
3.1 Introduction .....	26
3.2 Georgian Legislation Related to Environmental Permitting .....	26
3.3 ADB Environmental and Social Safeguards Requirements (SPS 2009) .....	30
3.4 EIA Requirements under Georgian and ADB Procedures .....	31
3.5 Environmental Screening for Current Project .....	32
3.6 Administrative Framework .....	32
3.6.1 The Roads Department (RD or RDMRD) .....	32
3.6.2 Ministry of Environmental Protection (MOE) .....	33
3.6.3 Ministry of Economy and Sustainable Development (MoESD) .....	33
3.6.4 Other Responsible Governmental Institutions .....	33
3.7 International Treaties and Conventions .....	34
3.7.1 The Convention on Biological Diversity, 1994 .....	34
3.7.2 The Convention on the Conservation of Migratory Species of Wild Animals ...	34
3.7.3 Convention on Wetlands of International Importance .....	34
3.7.4 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) .....	35
4. DESCRIPTION OF THE ENVIRONMENT .....	36
4.1 Physical Resources in Project Area .....	36
4.1.1 Climate .....	36
4.1.2 Air Quality .....	39
4.1.3 Background noise .....	42

4.1.4	Background radiation . . . . .	43
4.1.5	Information about the surface watercourses and ground pollution . . . . .	44
4.1.6	Topography and Relief . . . . .	47
4.1.7	Geological conditions of the study area . . . . .	48
4.1.8	Assessment of the Design Corridor Engineering-Geological Conditions by pickets (kilometers) . . . . .	54
4.1.9	Water Resources . . . . .	59
4.2	Ecological Resources – Landscape and Flora . . . . .	62
4.2.1	Landscape and Soils . . . . .	62
4.2.2	Vegetation . . . . .	63
4.2.3	Ecologically Sensitive Sites . . . . .	67
4.3	Ecological Receptors – Fauna . . . . .	68
4.3.1	General description of fauna . . . . .	68
4.3.2	Description of Biotops in Project Area . . . . .	72
5.	SOCIO-ECONOMIC CONDITIONS . . . . .	74
5.1	Demography . . . . .	74
5.2	Socio-Economic Characteristics . . . . .	76
5.3	Expected social impact of the Project . . . . .	83
5.3.1	General social impact of the Project . . . . .	83
5.3.2	Construction-related social impacts . . . . .	83
5.4	Land Acquisition and Resettlement . . . . .	84
5.5	Socio-Cultural Environment . . . . .	87
5.5.1	Historical Context . . . . .	87
5.5.2	Cultural Heritage in Project Area . . . . .	88
6.	ANALYSIS OF ALTERNATIVES . . . . .	89
7.	ENVIRONMENTAL IMPACTS . . . . .	94
7.1	Summary of Activities and Anticipated Impacts . . . . .	94
7.2	Specific Environmental Impacts. . . . .	99
7.2.1	Air Emissions Related to Construction Activities and Operation of Highway . . .	99
7.2.2	Noise Factor Related to Construction and Operation of the Road . . . . .	121
7.3	Potential Impacts Related To the Construction Activities . . . . .	123
7.3.1	Pollution and Waste . . . . .	123
7.3.2	Impacts on Flora . . . . .	125
7.3.3	Impact on Fauna . . . . .	125
7.3.4	Protected Areas . . . . .	126
7.3.5	Landscape . . . . .	126
7.3.6	Water Use . . . . .	126
7.3.7	Impacts on Archaeological Sites . . . . .	126
7.3.8	Transport related impacts . . . . .	126
7.3.9	Traffic Disruption . . . . .	126



7.3.10	Quarry-related Impact . . . . .	127
7.3.11	Construction Camp-related Impacts . . . . .	127
7.3.12	Construction Related Impacts at the Concrete Plant and Gravel Crushing Facilities . . . . .	127
8.	MITIGATION & ENVIRONMENTAL MANAGEMENT PLAN. . . . .	129
8.1	Mitigation Measures . . . . .	129
8.1.1	Mitigation of Construction Related Impacts . . . . .	129
8.1.2	Mitigation of Long-term and Operation Related Impacts . . . . .	144
8.2	Monitoring and enforcement . . . . .	144
8.3	Costs of Implementation . . . . .	146
8.4	Environmental Management Plan . . . . .	147
8.5	Environmental Monitoring Plan (Matrix) . . . . .	160
9.	PUBLIC CONSULTATION PROCESS . . . . .	165
9.1	Requirements for public disclosure and consultations . . . . .	165
9.2	Status of Public Participation . . . . .	166
10.	GRIEVANCE REDRESS MECHANISM . . . . .	173
11.	CONCLUSIONS AND RECOMMENDATIONS . . . . .	176

## VOLUME II. ANNEXES

**Annex 1.** Legal Framework and Administrative Structure in Georgia

**Annex 2.** Report of The Environmental Protection Agency on Measurements of Baseline Contamination Within The Project Area

**Annex 3** Modeling of Traffic Related Emissions

**Annex 4.** Licensed Quarries in Project Area

**Annex 5.** Procedures for Extraction of Plant Species Included in Red List of Georgia from the Natural Environment and Change of Category of Forestry Fund Land

**Annex 6.** Waste Management Plan for Construction Camps and Equipment Yards

**Annex 7.** Protocols of Public Consultation Meetings

## **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 <sup>2</sup>	square kilometres
litres/s	litres per second
m	metre
m <sup>2</sup>	square metre
m <sup>3</sup> /s	cubic metre per second
m <sup>3</sup>	cubic metre
mm	millimetre
s	seconds

## **CURRENCY EQUIVALENTS**

Currency Unit - Lari (GEL)  
\$1 = approx 1.637 (March 2012)

## **NOTE**

In this report, "\$" refers to US Dollars.

## **Executive Summary**

### **Background**

The modernization of road section-3 of 6.6 km from Phonichala to Rustavi forms a part of Tbilisi-Rustavi Highway with a total length of 17.1 km is one of the components /sub-projects identified for reconstruction. The Municipal Development Fund of Georgia (MDF) is the project executing, implementing and disbursing agency. The MDF is the Employer and acts on behalf of the municipality and the Road Department of Georgia. The project will focus on the improvement of the existing transport services linking Tbilisi to Rustavi. The Project includes targeted measures and specific facilities such as provision of interchanges, road widening, bus stops, road marking, revetment, stabilization treatment of sanitary area, footbridge or underpass to ensure a quick, safe and reliable bus services and guarantee proper physical connection with metro network at the entrance of the city.

The national consulting firm (foundation) WEG has been engaged by DOHWA Engineering co., Ltd/Transproject Ltd to prepare and deliver the IEE for Tbilisi-Phonichala 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:
- Socioeconomic 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-Phonichala Section. Further, this existing road continues towards the Tbilisi-Red Bridge (Azerbaijani Border) Road up to 17.1 km as end of the Project.

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 Section 3. **Section 3: Phonichala - Rustavi** has 6.7km long length of road alignment on the Project. Tbilisi-Ponichala section of the project alignment is entirely located in Gardabani district, Alignment of project road mainly coincides with the alignment of the existing road Tbilisi-Red Bridge. Radii of horizontal and vertical curves, longitudinal and transverse slopes, superelevations correspond to highway parameters according to the Terms of Reference. Design road axis passes on the right shoulder of the existing road. It will be considered upgrading the existing section of the road between the settlement of Phonichala and Rustavi. The existing 2 lanes road will be upgraded to 4 lanes. The width of each lane is 3.75m. The central barrier has 6m width and no sidewalk on this section. Pavement is of concrete. The project will require filling of the existing channel passing in parallel with the road and construction of a new channel nearby. The new road infrastructure includes one bridge over the new design channel and 2 bridges at interchange and 3 interchanges. Construction of the infrastructure will entail acquisition of additional private land and will affect private structures and businesses somewhat. Besides, construction of the road will require replacement of the existing utilities and communication infrastructures either.

In addition, the project's special focus will also be given to the improvement of the express bus services linking Tbilisi to Rustavi, with specific facilities such as bus stops, road marking, footbridge or underpass will be developed to ensure a quick, safe and reliable bus services and guarantee proper physical connection with metro network at the entrance of the city.

## **Government Policies and Legislation, ADB SPS**

The Annex 1, 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
- 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).

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.

Potentially positive impacts that could result from the Project include, safe driving conditions for transit motor transport flows and local residents and higher carrying capacity of the road. The design road is also very much important for the socio-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 120,000 residents of Rustavi work or study in Tbilisi.

In addition, the modernization of Tbilisi-Red Bridge (Azerbaijani border) road will allow transporting the passengers and various goods to Baku, the capital of Azerbaijan through the improved and modern road. This road will also make Tbilisi and Georgian Black Sea resorts and ports more accessible to the population of Azerbaijan.

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. 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 legalizable 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).

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.

## **1. INTRODUCTION**

### **1.1 Background**

1. The Government of Georgia signed a loan agreement of USD 85 million with the Asian Development Bank (ADB) under a MFF to implement the Sustainable Urban Transport Investment Program-Project-1. The modernization of road section-3 of 6.1 km from Phonichalato Rustavi forms a part of Tbilisi-Rustavi Highway with a total length of 17.1 km is one of the components /sub-projects identified for reconstruction. The Municipal Development Fund of Georgia (MDFG) is the project executing, implementing and disbursing agency. The MDFG is the Employer and acts on behalf of the municipality and the Road Department of Georgia. The objective of the Project is to develop an efficient, affordable, and environmentally sustainable transportation system that forms a part of the south-east route of the country.

2. The project will focus on the improvement of the existing transport services linking Rustavi to Tbilisi. The Project targeted measures and specific facilities such as provision of interchanges, road widening, bus stops, road marking, footbridge or underpass included to ensure a quick, safe and reliable bus services and guarantee proper physical connection with metro network at the entrance of the city. The Program was developed as the Government's response to the transportation problems in urban areas, which include large traffic volumes between Tbilisi and Rustavi route causing increasing delays, as a result of previous under-investment in infrastructure maintenance and expansion.

### **1.2 Objectives**

3. This Initial Environmental Examination (IEE) has been prepared for Section-3, 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 overall Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azerbaijani Border) Road of 17.1 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.

4. 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**

5. 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.

6. 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.

9. 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.

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

## 2. DESCRIPTION OF THE PROJECT

12. The proposed Project is an Investment Program under MFF for the SUTIP-P1. The interventions considered under this Tranche include road shoulder improvement, road widening for development of 4 or 6<sup>1</sup> lanes from existing 2 lanes, pavement strengthening, drainage improvement, construction of new bridges/railway bridges, retaining walls, interchanges, overpass and underpasses for easy crossing of the local people and animals. The length of 17.1 km is divided into 3 sections. As such, Section-1 starts from 0.0 to 4.0 km; Section-2 from 4.0 to 10.5km<sup>2</sup> and Section-3 is 10.5 to 17.1km. This IEE is developed for 6.6km length Section-3 from Phonichala to Rustavi.

<sup>2</sup>Under the Subproject 2 (Phonichala subproject) currently several alternative options are considered: the first variant envisages the upgrading of the existing road from 2 lane to 4 lane and other 3 options consider construction of 4 lane road with alternative alignments. For all of these alternative options the starting point is KM 4.0 of the existing road, and the end point is KM 11.



footbridge or underpass will be developed to ensure a quick, safe and reliable bus services and guarantee proper physical connection with metro network at the entrance of the city.

## 2.2 Type and Category of Project

14. This is a road upgrading project from 2 lanes to 4 lanes. This reconstruction is to meet four lane Georgian design standard within the existing right-of-way (RoW) and categorized by ADB as Environment Category B since some adverse issues of lesser degree are involved with it for environmental assessment and therefore, an IEE is prepared.

## 2.3 Need for Project

15. Georgia's geographical location positions the country at the center of both East-West (the Black and Caspian Seas) and North-South (between Russia and Turkey) transit routes. Trade with neighboring countries is an important feature of the Georgian economy and estimated to be worth more than US\$2 billion. The Government of Georgia (which assumed office after the Rose Revolution in 2002) made it a key priority to rehabilitate transport, energy and rural infrastructure, which had deteriorated significantly since 1990. Recognizing the importance of infrastructure to the sustainable economic development of the country, the Government has managed to substantially increase investments in these sectors.

16. One of the Government's priorities has been to develop Georgia's competitiveness as a transit country by improving its East-West Transport Corridor and this is recognized in the National Development Plan. In the years 2003-2004 Louis Berger and Transprojekt Roads Survey and Design Institute of Georgia prepared a TACIS funded study on Rehabilitation of Caucasian Roads. This provided a significant amount of data for the existing roads and an improvement strategy with additional by-pass options to relieve traffic volumes and congestion in the urban areas through which the existing main highway still passed.

17. By now, the construction of some sections (Tbilisi-Agaiani, Agaiani-Igoeti, Igoeti-Gori) of the Eurasian corridor (E-60 highway) highway is accomplished and the construction of Kobuleti bypass is underway. At the same time, the modernization projects of other sections of the road are being developed.

18. International road Tbilisi-Red Bridge (Azerbaijan border) is an integral part of TRACECA Transport Corridor. The road links Georgia with Azerbaijan as well as with Europe and Asia. The modernization of Tbilisi-Red Bridge (Azerbaijani border) road allows transporting the passengers and various goods to Baku, the capital of Azerbaijan through the improved and modern road. This road will also make Tbilisi and Georgian Black Sea resorts and ports more accessible to the population of Azerbaijan. Tbilisi-Rustavi design freeway envisaged by the present project is a part of Tbilisi-Red Bridge road.

19. The design Tbilisi-Rustavi section of Tbilisi-Red Bridge (Azerbaijani border highway) road links the capital of Georgia with the major industrial and administrative center Rustavi and the district center Gardabani. Rustavi with its population of 120 thousand people is the main satellite city of Tbilisi megalopolis. Thus, the travel between Rustavi and Tbilisi is intense. This is natural if considering that many Rustavi inhabitants commute on daily basis towards Tbilisi to work or study. The existing 2-lane highway (one in each direction) has not enough capacity to carry the whole traffic entering or exiting Tbilisi at peak hours.

20. According to the data of the Road Department of the Ministry of Regional Development and Infrastructure of Georgia (hereinafter referred to as "The RD"), the given section of the design road is overloaded, with the traffic intensity exceeding 14.000 vehicles a day, while the maximum carrying capacity of the existing road is 7.000 vehicles a day. The overloaded traffic often causes traffic jams creating major discomfort for the passengers. In addition, the increased amount of fuel used leads to the increased proportion of emission of products of

combustion in the atmospheric air and deterioration of the atmospheric air quality in the adjacent settled areas.

21. Technical parameters of the existing road do not meet safety requirements, resulting in frequent accidents leading to injuries and human toll as well as economic loss. Sharp increase in the traffic intensity in terms of improper conditions of the road infrastructure often leads to car accidents. In this context, the Georgian Government has decided to improve the capacity of Tbilisi-Rustavi link by upgrading the road into a freeway.

22. 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 KvemoKartli region, particularly for the population and industries in the city of Rustavi and Gardabani region.

## 2.4 Location

23. Tbilisi-Rustavi road is located in Tbilisi and Gardabani district. The length of the design Tbilisi-Rustavi road is 17.1km. Generally, the aim of the project was to lay the road along the route recommended by the Feasibility Study Report; however, rerouting of some sections turned out to be necessary, in particular:

24. **Section 3: Phonichala - Rustavi** has 6.7km long length of road alignment on the Project. Tbilisi-Ponichala section of the project alignment is entirely located in Gardabani district. Alignment of project road mainly coincides with the alignment of the existing road Tbilisi-Red Bridge. Radii of horizontal and vertical curves, longitudinal and transverse slopes, superelevations correspond to highway parameters according to the Terms of Reference. Design road axis passes on the right shoulder of the existing road. It will be considered upgrading the existing section of the road between the settlement of Phonichala and Rustavi. The existing 2 lanes road will be upgraded to 4 lanes. The width of each lane is 3.75m. The central barrier has 6m width and no sidewalk on this section. Pavement is of concrete. The project will require filling of the existing channel passing in parallel with the road and construction of a new channel nearby. The new road infrastructure includes one bridge over the new design channel and 2 bridges at interchange and 3 interchanges. Construction of the infrastructure will entail acquisition of additional private land and will affect private structures and businesses somewhat. Besides, construction of the road will require replacement of the existing utilities and communication infrastructures either.

**Table 2.1: Description of Section-3**

Item	Length	Lane/ Width of cross section	Civil works items	Remark
Section 3	6.6 Km	4 lanes/ 28.5m	Interchange : 3EA Bridge : 3EA	



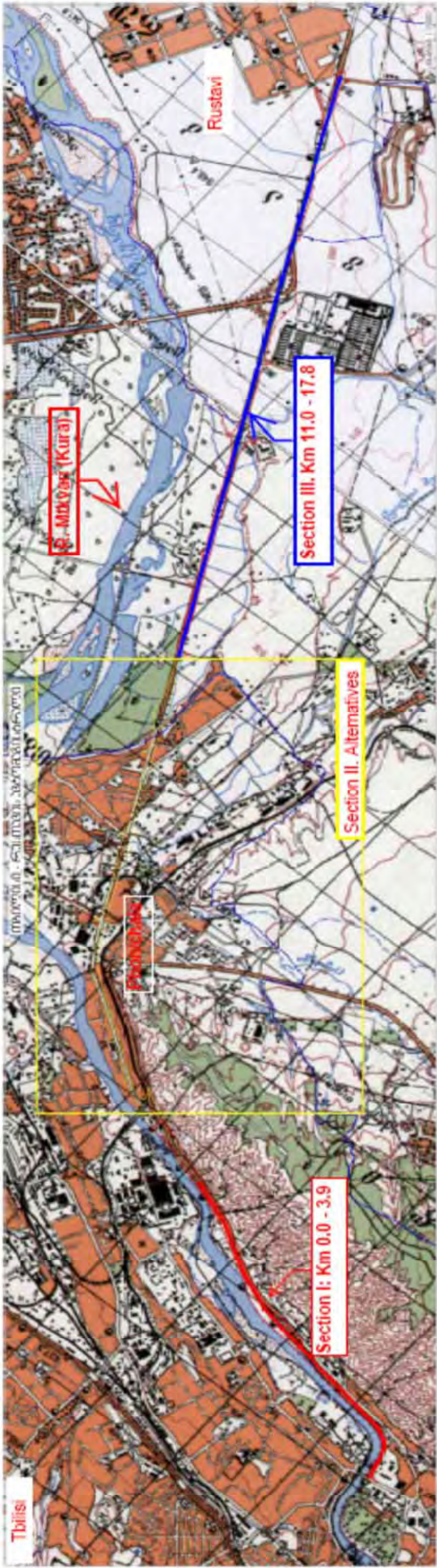


Fig.2.10thophoto and Topographic Map of the entire Tbilisi – Rustavi Section of the Highway



## 2.5 Proposed Schedule for Implementation

25. The Project is scheduled for implementation over a period of 17 months, starting in 2012.

## 2.6 Design Criteria and Parameters

### Application of standard

26. Design loads– Georgian National Standards, TEM and SNIP

Bridges and overpasses –Georgian National Road Design Standards  
–Georgian Seismic Standards  
–SNIP

Traffic safety conditions - in accordance with TEM and SNIP standards.

Construction of 6-lane road in Tbilisi and 4-lane road after Tbilisi until Rustavi is envisaged in the design. Technical parameters adopted for the section Ponichala-Rustavi:

- Design speed – 120 km/hr;
- Maximum longitudinal slope – 1.7%;
- Minimum convex curve – 40 000 m;
- Minimum concaved curve – 40 000 m;
- Crossfall – 2%;
- Number of traffic lanes - 4X3.75 m;
- Width of roadway – 28.5-45.5 m;
- Width of carriageway – 2X7.5 m;
- Width of lane - 3.75 m;
- Width of paved shoulders - 3.0 m;
- Width of dividing strip - 4.0-17.0 m;
- Roadside - 0.75 m.

### Roadway

27. Width of roadway adopted in the design for the road section Ponichala-Rustavi is 28.5-45.5m.

Width of dividing strip is adopted 4.0-17.0 m. Widening of dividing strip starts from PK 141+00, reaches its peak under the existing overpass at PK 145+60 and ends at PK150+50.

Width of paved shoulders is 3.0 m.

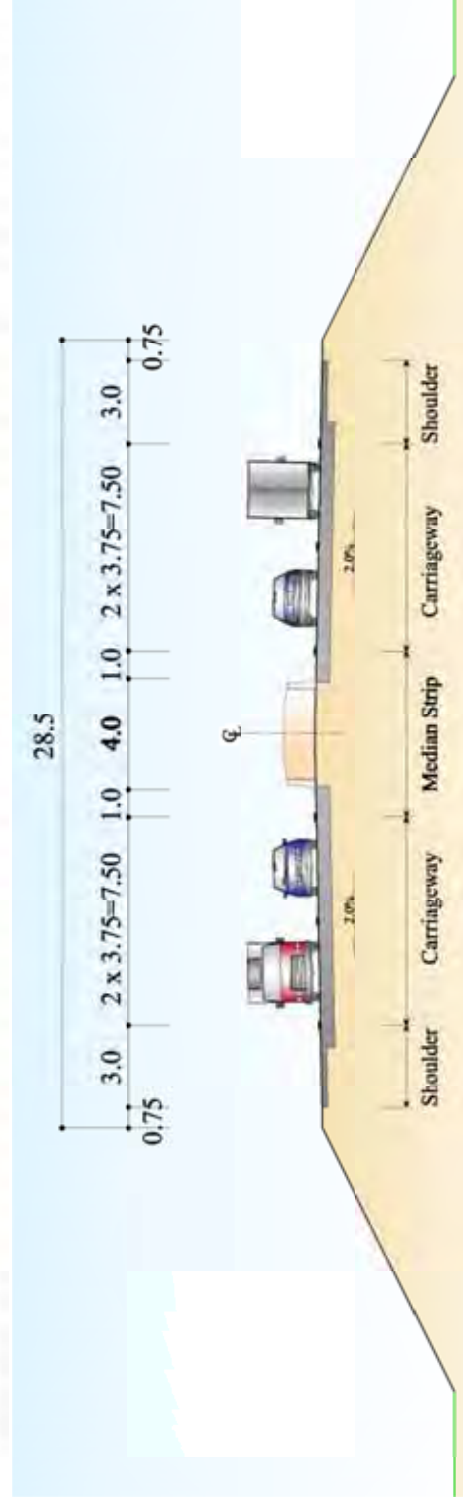
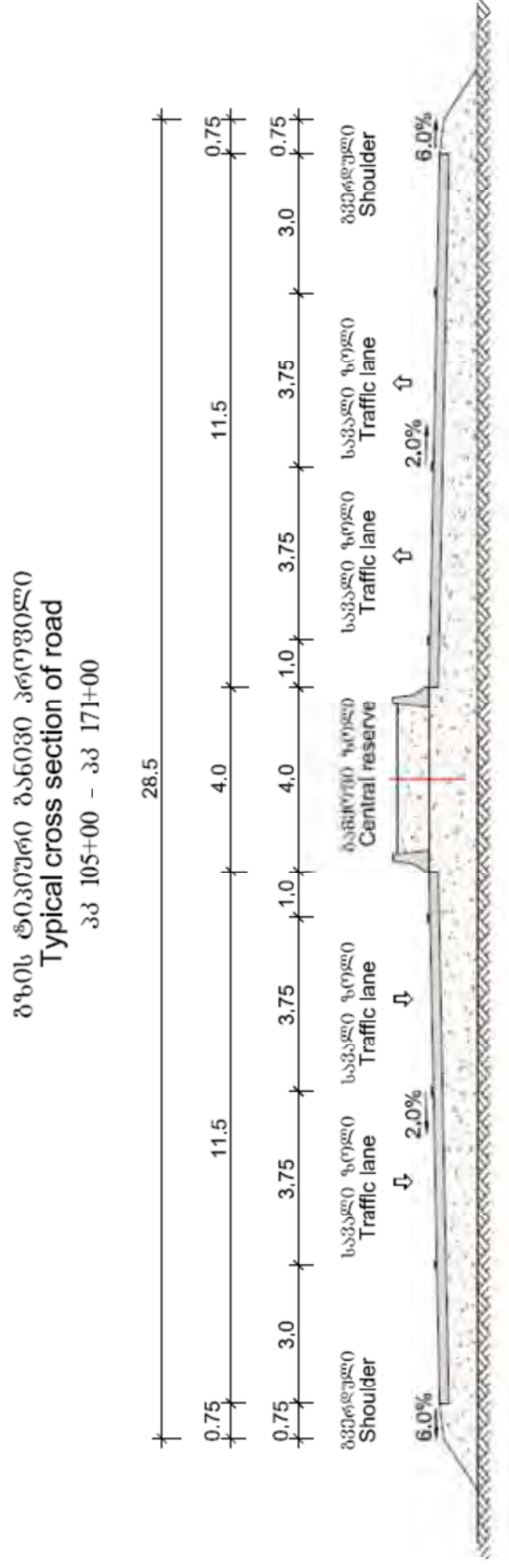
Width of unpaved shoulders is 0.75 m.

Fill slope adopted is 1:1.5.

Cut slope adopted is 1:1.5.

Volumes of earthworks are calculated according to the design cross profile.

28. Widths of main lanes, paved shoulders and roadside are shown on the cross-sections, however widths of acceleration-deceleration lanes to be constructed at junctions and interchanges are not shown (see in a separate Table).



## 2.7 Road Pavement Structure

29. Road pavement structure is designed considering technical and economic parameters and based on the following data:

- Traffic flow;
- Reliability factor;
- Service life.

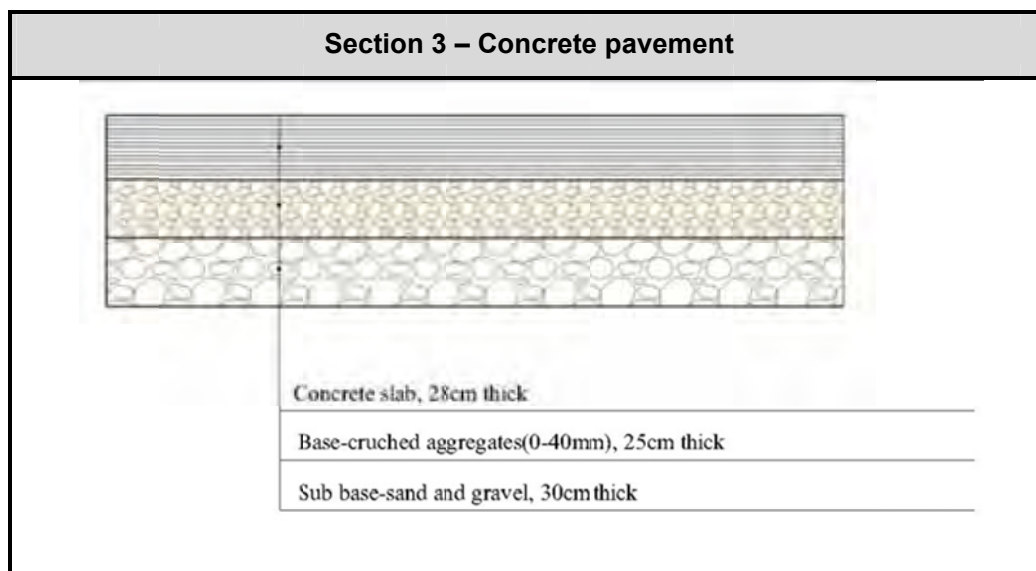
30. Corresponding works for determining traffic flow were carried out, as well as expected future traffic flows for each year of the study were determined. Traffic loads are based on the expected traffic flows. Design reliability ensures good performance of pavement for the design period based on calculations of the expected traffic flows.

31. Design reliability of pavement is calculated for both traffic flows and service life, thus ensuring reliability means uninterrupted performance of pavement for the period of service life. Design service life of pavement structure is at least 20 years.

32. Both rigid and non-rigid pavement alternatives were studied whilst selecting the road pavement structure. Comparison of pavement alternatives identifies that rigid pavement has some advantages over non-rigid pavement. However, within the limits of Tbilisi application of non-rigid pavement has the advantage as in case laying of utilities is required, cutting out the rigid pavement and its re-paving shall be complicated. Considering the above-mentioned, non-rigid pavement was applied on the section Tbilisi-Ponichala, whilst rigid pavement shall be applied on the section Ponichala-Rustavi.

**Table 2.2 Rigid Pavement Structure : Pavement Layers and Thickness**

Sl. No	Pavement Layers	Thickness of pavement layers, mm
1	2	3
1	Cement concrete (pavement)	280
2	Crushed aggregates (base course)	250
3	Sand and gravel mix (sub-base)	300



## 2.8 ENGINEERING STRUCTURES

### Junctions and intersections

33. Construction of grade separate junctions and intersections is stipulated in the design:

#### Interchange N2 on the road section Ponichala-Rustavi

Interchange N2 shall be constructed at PK 128+20. The interchange envisages junction of U-turn and local approach roads with the motorway.

#### Reconstruction of Interchange N3

34. Reconstruction of the existing interchange N3 at PK 145+58 is envisaged in the design. The interchange was constructed at the intersection of international road Tbilisi-Red Bridge with Tbilisi by pass road.

#### Interchange N4

35. Interchange N4 shall be constructed at PK 167+50 at the intersection of approach road to Rustavi and Tbilisi-Red Bridge road.

Parameters used for two-way traffic on interchanges:

- Width of traffic lane – 3.5 m;
- Width of paved shoulder – 1.0-2.0 m;
- Width of unpaved shoulder – 0.75 m.

Parameters used for one-way traffic on ramps:

- Width of traffic lane – 4 m;
- Width of paved shoulder – 1.0-2.0 m;
- Width of unpaved shoulder – 0.75 m.

Parameters used on ramps of interchanges:

- Design speed – 40 km/hr;
- Minimum radius in plan – 50 m;
- Maximum longitudinal slope – 5%;
- Minimum convex radius – 1000 m;
- Minimum concaved radius – 850 m.

### Bridges

List of Bridges in the section-3

Bridge ID #	Station(km)		Bridge Name	Superstructure Type	Overall Geometry		
	Beginning	End			Length	Width	Skew
Br 04	12+528.34	12+568.66	BR. 4	Pre-stressed reinforced concrete beams, L=33m	40.32	31.60	
Br 05	12+899.84	12+940.16	BR. 5 (Underpass)	Pre-stressed reinforced concrete beams, L=33m	40.32	28.0	
Br 06	16+750		BR. 1 (Overpass)	Pre-stressed reinforced concrete beams, L=33m	139.97	19.84	30°



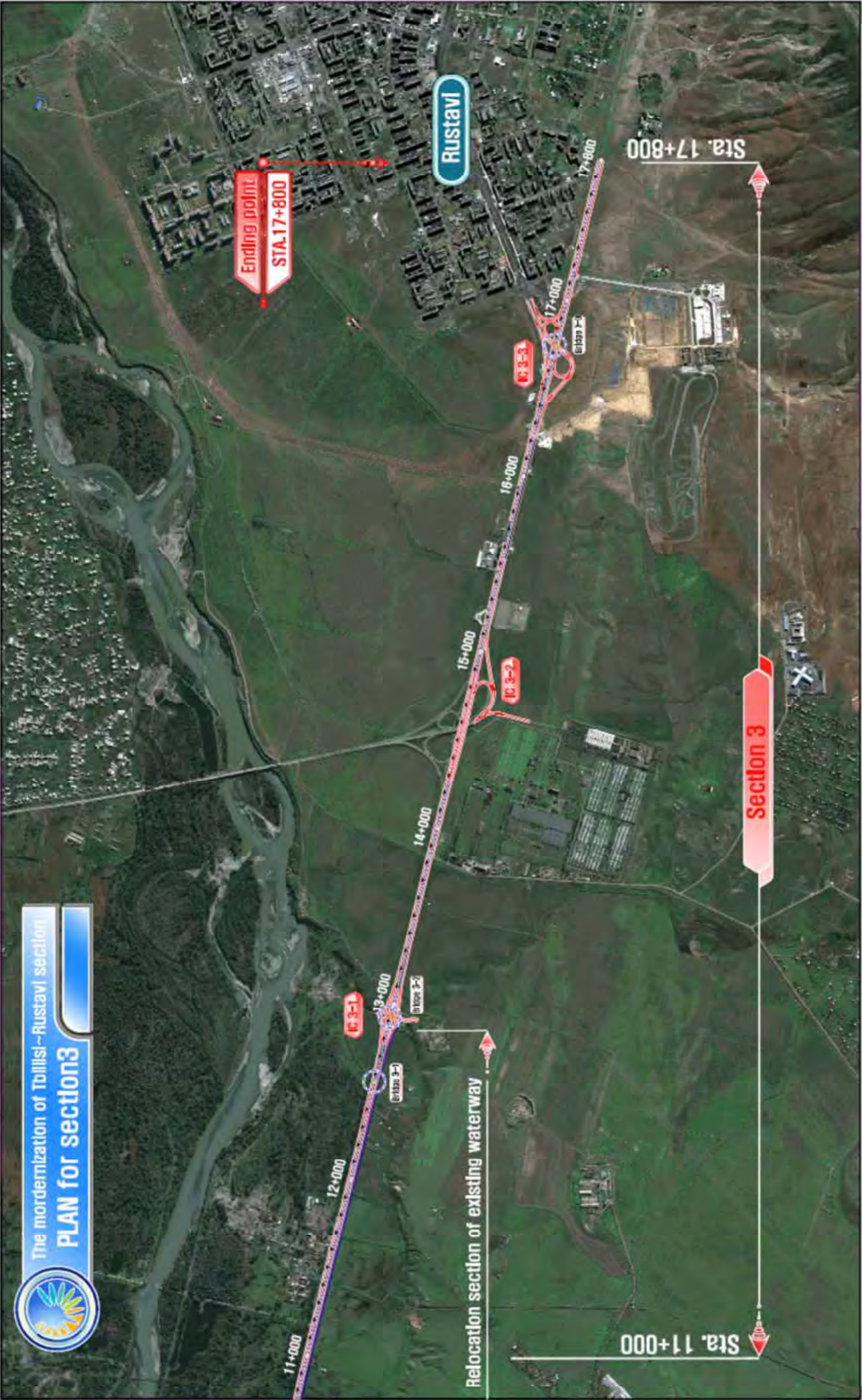


Fig. 2.3. Section 3 Layout with Bridges and Interchanges



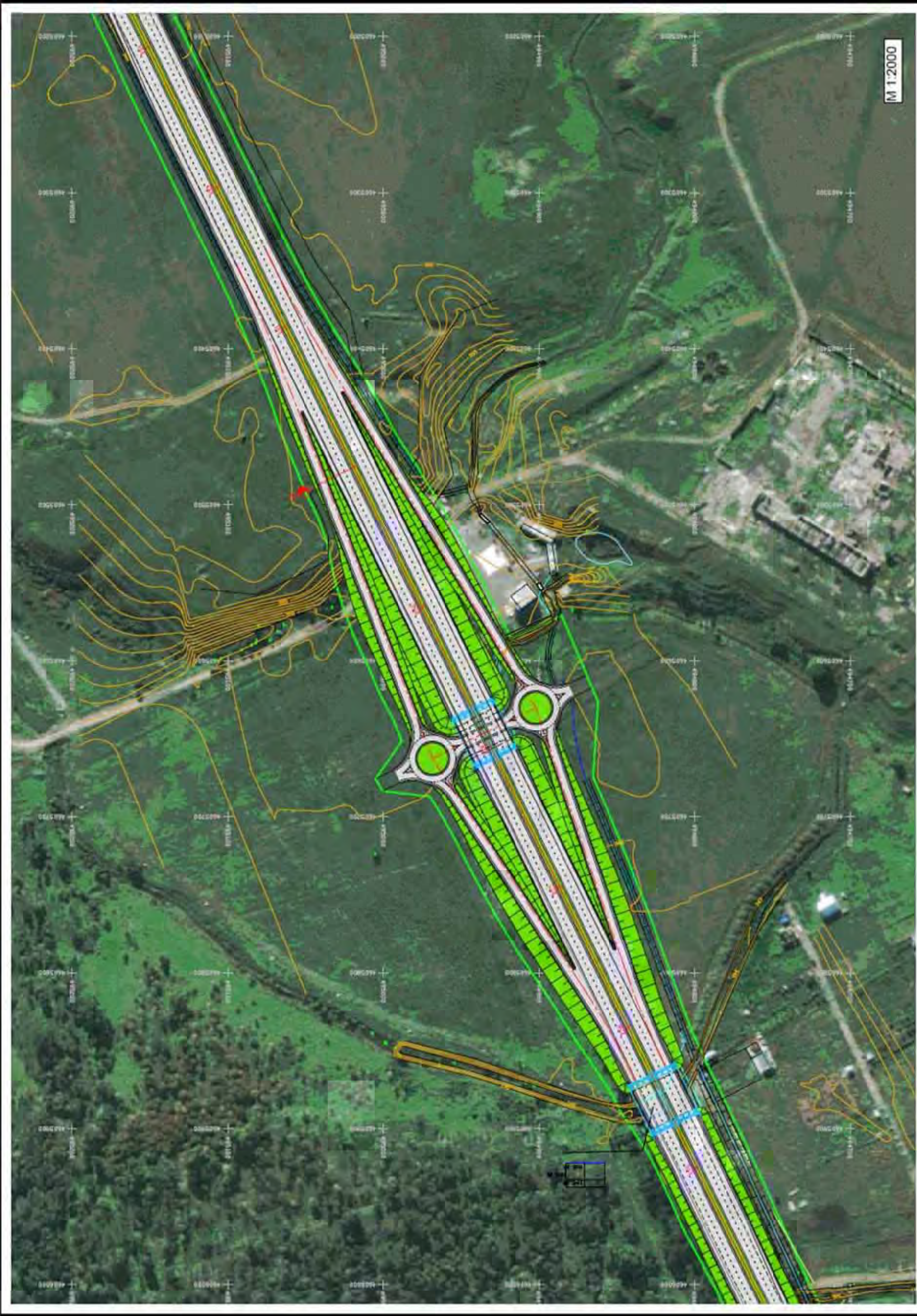


Fig. 2.4 Layout of the Bridges and Interchange on km 12.5 – 12.8





Fig. 2.5 Interchange on KM 14.5



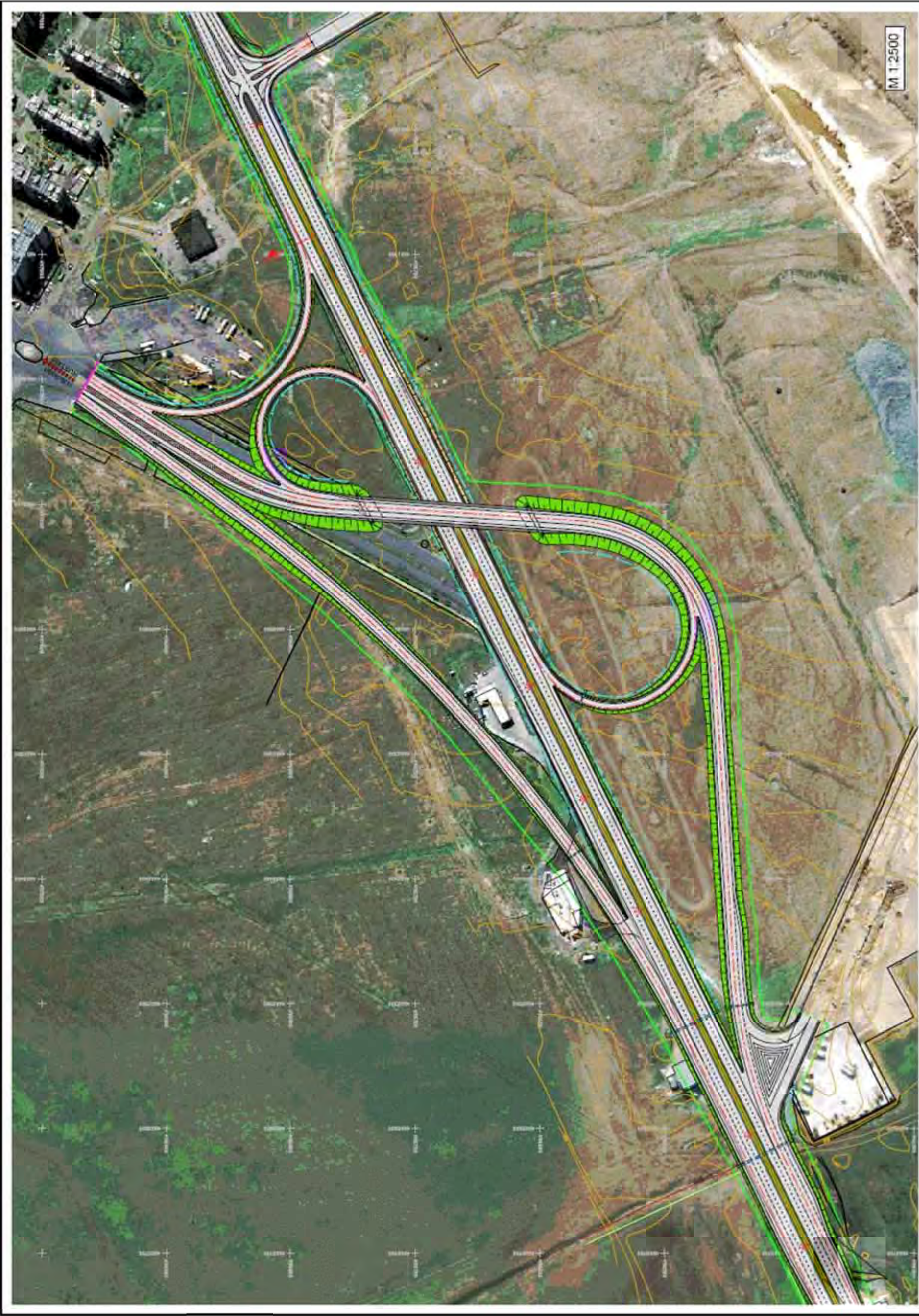
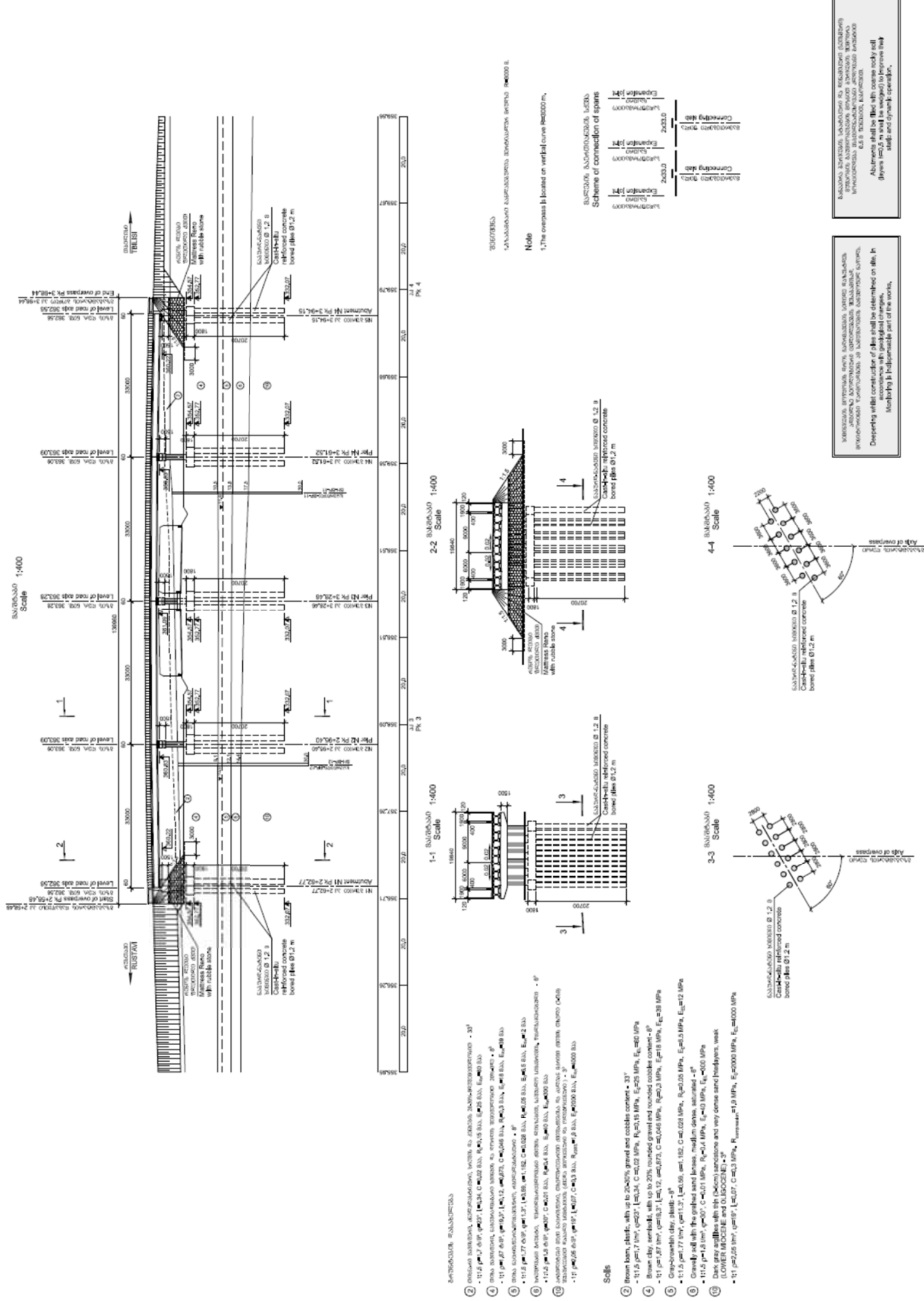
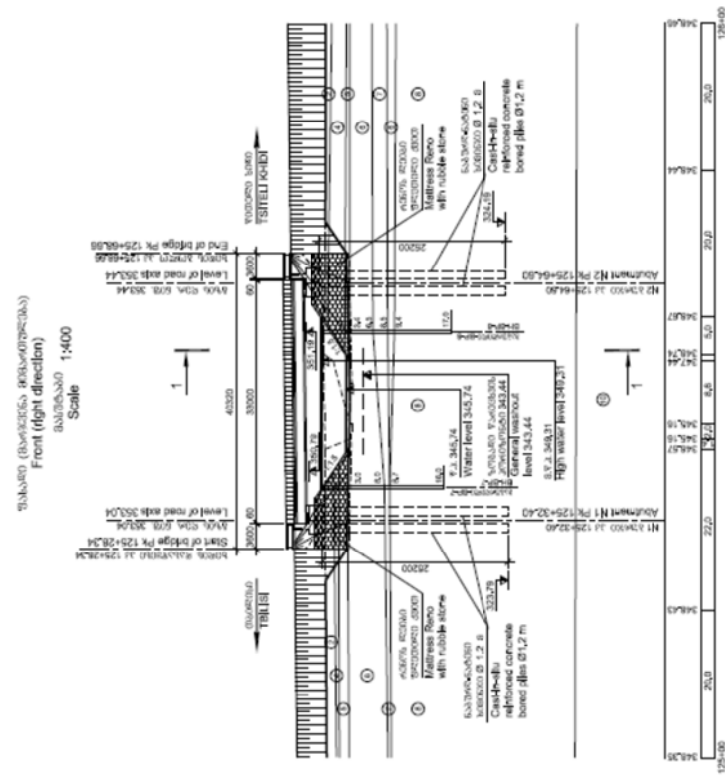


Fig.2.6 Layout of the Interchange on km 16.75





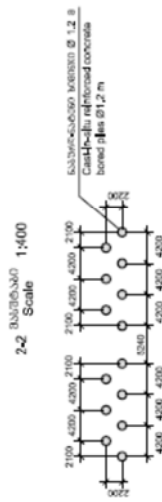
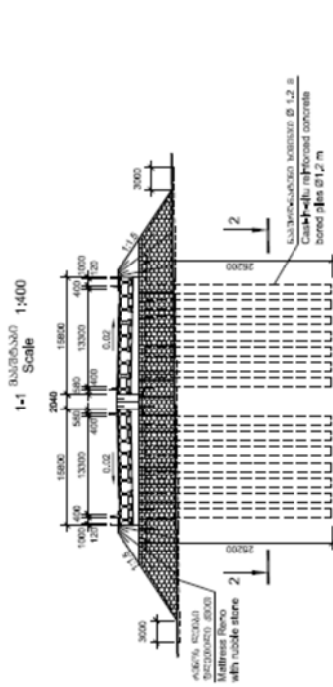
**Fig. 2.7 Drawing of Bridges**



ВВЕДЕНИЕ  
1. ОБЩИЕ СВЕДЕНИЯ  
2. ПОДРОБНОЕ ОПИСАНИЕ  
3. ЗАКЛЮЧЕНИЕ  
4. ПРИЛОЖЕНИЯ

706073365

**Note**  
1.  $P_k$  values are given along the axis of road.

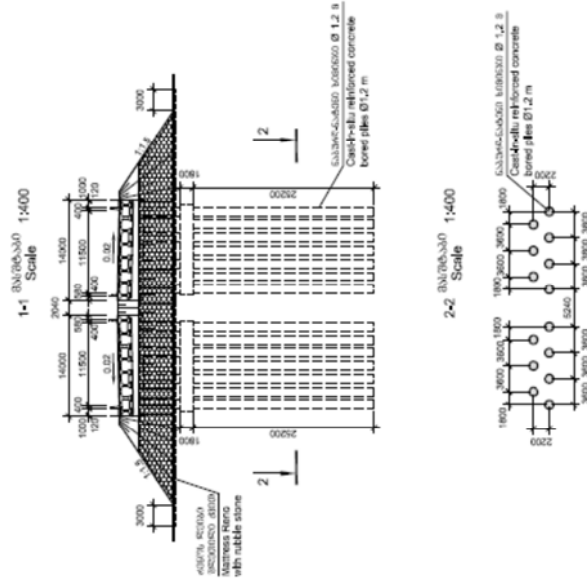
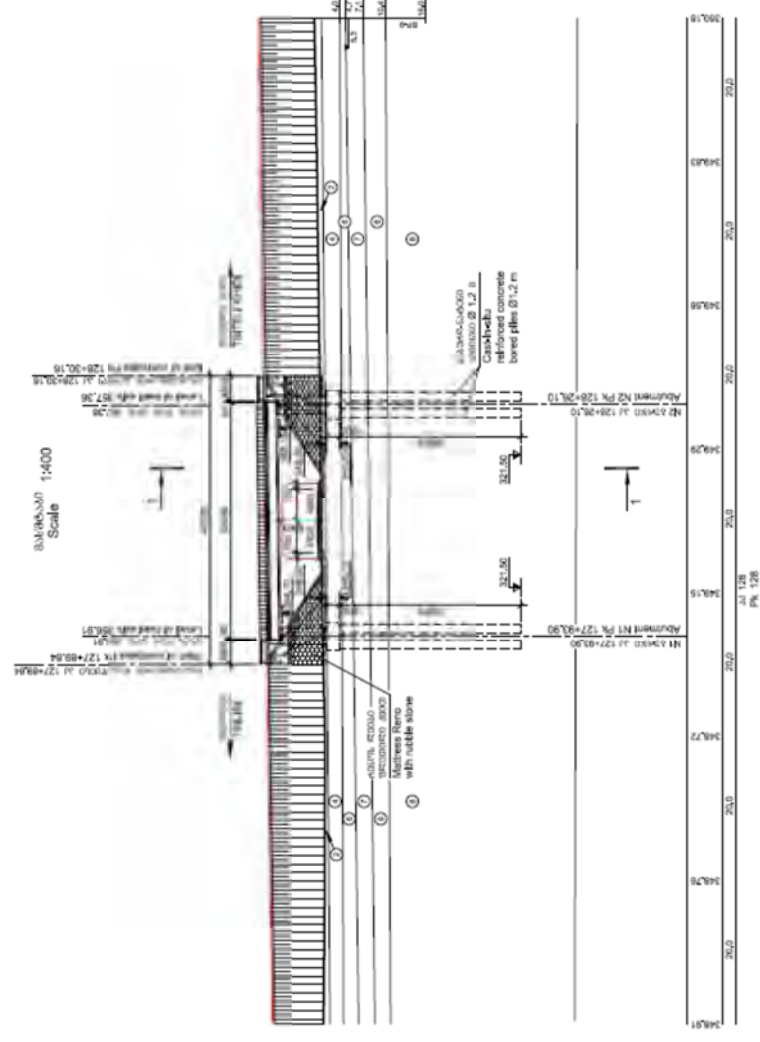


Deepening whilst construction of piles shall be determined on this, in accordance with geological changes.

Abstracts shall be filled with coarse rocky soil (layers 1-0.5 m) and be weighed to improve their static and dynamic properties.

[illegible]

**Fig. 2.8 Drawing of Bridges**

[illegible]

**Fig. 2.9 Drawing of Bridges**



## Superstructure

36. Pre-stressed reinforced concrete beams, length  $L=33\text{m}$  are applied in superstructure of bridges. Beams are united in the cross-section by means of longitudinal reinforce concrete seam.

Superstructure is strengthened by means of cast in situ reinforced concrete slab  $h=10\text{ cm}$ , constructed directly on beams. The slab operates together with superstructure beams. It also has the function of leveling layer under the asphalt layer.

37. There are 8, 9 and 11 beams in the cross-section. Bridge spans are united in one continuous temperature system (4 spans at most) for more effective live load performance and for the improved ride comfort. Thickness of asphalt concrete pavement on carriageway is  $h=7\text{ cm}$ . The bridges has sidewalks for maintenance. Abutment cones located along the reinforced concrete barriers represent the drainage system on bridge. Open spillway into the cones takes place when the cross-fall is 2.0%, then water happens under the superstructure, into the longitudinal culvert and on into treatment facilities.

Superstructure is based on rubber bearing parts, which are calculated to reduce seismic impact of 8 points earthquake (bearing parts are adopted in accordance with the typical design decision).

Structure of railing shall be of steel section. Barriers are of cast in situ reinforced concrete. Movement joints are with rubber compensators (acceptable in seismic regions).

## Piers

38. Structure of piers is similar for each bridge. Columns based on raft foundation with cast in situ concrete bored piles were adopted as piers (11 piles).

Pier body consists of 3, 4 reinforced concrete ellipse-shaped columns with reinforced concrete cross-beams based on them, with maximum console length 3.6 m. Stops against seismicity shall be constructed on cross-beams.

39. Abutments are of one types that type is adopted for the approaches with high fills- it's a structure of 4 columns based on raft foundation with cast in situ concrete bored piles (cross-section of columns on abutments is identical to that of piers). Reinforced concrete cross-beams, wing-walls and end-walls are constructed on columns in accordance with the design. Reinforced concrete parapets shall be constructed on wingwalls.

40. For foundation of substructures, cast-in-place bored pile with reinforced concrete was adopted due to local field condition, environment effect, supply of materials and etc. The diameter of bored pile is 1.0m for all bridges.

Concrete bored piles are constructed by Reverse Circular Drilling (RCD) method. Drilling into ground is reached until the design depth or foundation bearing layer. After the hole is then cleaned, steel reinforcement cage is placed into the hole and then pour concrete into the hole until cut-off level of the pile designed.

## 2.9 Utility Relocation

41. The Consultant have been in contact with a number of Utility companies which on the project area and had quite a few times of meetings for the utilities relocation works. The Consultant has been under preparation of utility relocation design for the project site area.

Table 9.1: List of Utility companies & utilities relocation design companies on Project area

No	Name of company	Utility Type	Description of Utility Relocation
1	KazTransGaz	Gas	Existing $\Phi 530$ Gas pipes cross Highway at STA. 11+800
2	BP	Oil and gas pipelines	Existing $\Phi 42/46$ inches BTC pipes from designed level is 1.85m at Highway STA. 13+584.20

			Existing $\Phi$ 42 inches SCP pipes from designed level is 3.535m at Highway STA. 13+595.70
3	GWP	Water supply and sewage	Existing $\Phi$ 800 Water pipes along track Highway from STA. 10+500 to STA. 17+200
4	JSC Telasi	Power supply	Existing 6KV cables along track Highway from STA. 10+500 to STA. 17+200
5	ENERGO-PRO Georgia	Power transmission lines	Existing 11m concrete transmission towers track Highway from STA. 12+702 to STA. 16+831 Existing 9m concrete transmission towers track Highway from STA. 11+565 to STA. 16+831
6	SINATLIS QALAQI LTD and relevant organizations in Rustavi and Gardabani	Electric poles	Existing lighting poles track Highway from STA. 0+000 to STA.4+000 Existing lighting poles track Highway from STA. 11+400 to STA.17+100
7	Caucasus Online	Internet	Existing internetlines track Highway from STA. 10+500 to STA. 17+200
8	Silknet	Internet and telephone	Existing internet and telephone lines track Highway from STA. 10+500 to STA. 17+200
9	AkhaliKselebi	Telephone	Existing telephone lines track Highway from STA. 10+500 to STA. 17+200
10	CGC	Cables	Existing internet and telephone lines track Highway from STA. 10+500 to STA. 17+200
11	FOPTNET	Cables	Existing cables track Highway from STA. 10+500 to STA. 17+200
12	Deltacom	Cables	Existing cables track Highway from STA. 10+500 to STA. 17+200

## Road Furniture and Equipment

### Traffic regulations and safety

42. Construction of dividing strip, 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.

### Road signs

43. Installation of standard III-type size road signs is envisaged in the design to ensure traffic safety on Tbilisi-Rustavi road PK 105+00-PK 171+00 (Ponichala-Rustavi). Installation of road signs shall be done according to the requirements of GOST 10807-78, GOST 17918-80, ISO/ES, ASTM standards.



Frames of standard road signs are constructed from steel profiles galvanized with zinc, thickness 1.2mm. Road signs of individual design are constructed from aluminum profile with aluminum frame.

44. The images shall be applied on plates with light-reflecting film of „3M“ engineering-prism type, using appliqué method with cutting on plotters in advance. The film shall meet technical requirements of ASTM, EN 12899 standards.

- Standard - 86 units;
- Of individual design - 19 units.

45. Installation of II-type size road signs on subsidiary (junctions, intersections) roads is stipulated under the present design. Standard road signs and road signs of individual design shall be installed on shoulders on condition that the distance between the edge of the sign and the edge of carriageway should be at least 0.5m. Total number of signs to be installed on subsidiary roads is:

- Standard II-type size - 149 units;
- Individual – 2 units.

The road signs shall be installed on special berms outside the road bed. Standard road signs shall be fixed on steel posts, diameter 76-102 mm, thickness of wall 4 mm.

- 76 mm – 89 units;
- 102 mm – 45 units.

46. Plates of road signs of individual design shall be fixed on steel structures (three posts) and on full-frame structures.

- Steel full-frame structure - 6 units;
- Steel three-post structure - 9 units.

### **Carriageway Marking**

47. Horizontal line marking of carriageway shall be carried out with two-component structural plastic with light reflecting glass balls, thickness 2 mm (to meet technical requirements of ISO 9001, EN 1423, EN 1424, BAST (German standards).

Design includes:

- Continuous lines (1.1) width 100-150 mm – 671.5 m<sup>2</sup>
- Continuous lines of side marking (1.2), width 100-150 mm – 7191.2 m<sup>2</sup>
- Double continuous lines (1.3) width 150-150 mm - 150 m<sup>2</sup>
- Broken lines, (1.5) ratio 1:3, width 100-150 mm– 1046.5 m<sup>2</sup>
- Broken lines, (1.6) ratio 3:1, width 100-150 mm – 27.3 m<sup>2</sup>
- Marking of cross-road, broken lines, (1.7)  $l_1=l_2$ , width 100mm – 40.1 m<sup>2</sup>
- Broken lines, (1.8)  $l_1=l_2$  width 200-400 mm,  $l_1=1.0$ m,  $l_2=3.0$  m – 674.1 m<sup>2</sup>
- Marking 1.13, 1.13, 1.16.1; 1.16.2; 1.16.3, 1.20 – 1172.5 m<sup>2</sup>
- Marking 1.18 length of arrow 5.0 m-7.5m– 1771.3 m<sup>2</sup>
- Marking 1.19 length of arrow 5.0 m-7.5m – 270.1 m<sup>2</sup>

Total horizontal line marking – 13029.6 m<sup>2</sup>.

### **Road Barriers**

48. Road fencing shall be constructed from steel guardrails (cinolalpol covered) f-3 in accordance with requirements of standards GOST 23457-86, GOST 26804-86 and EN 1317. Total length for section 1 and 3 is 9188 L.m. Design envisages installation of plastic guide (signal) posts on shoulders - 722 units, plastic guide (signal) posts on marking line - 1004 units, reinforced concrete barriers on the dividing strip - 19639 linear m, concrete parapets of special profile – 64 units. Location of road signs, pavement marking, fencing and plastic guide (signal) posts is given on corresponding drawings. Details of road signs, pavement marking, barriers and plastic guide (signal) posts are given on corresponding schemes. The activities and decisions adopted in the design ensure proper traffic regulations and safety.

### **Sidewalks, Bus Stops and Shelters**

49. Sidewalks are not constructed for the section 3, as the whole alignment is out of Tbilisi and Rustavi cities and serve as connecting highway.

Bust stops with acceleration-deceleration lanes shall be constructed on Ponichala-Rustavi road section. Construction of shelters and footbridges on both sides of the road is envisaged in the design at PK 114+56 and PK 137+31.

### **Construction works**

#### **Preparatory works**

50. During the road construction, the existing utilities and communications infrastructure, such as water supply and sewerage pipes, power lines, optical-fiber cables, etc., will be necessary to relocate. The utilities subject for relocation were listed above.

51. Prior to starting the road construction works, the project envisages the accomplishment of the preparatory works.

The preparatory works include:

- Fixing of road layout and construction corridor - 6.7 km
- Relocation of the utilities
- Tree felling - about 400 trees
- Felling and digging out of bushes - 1,4 ha
- Disassembly of the existing buildings and premises and all related works
- Freeing the building site for the road construction off archeological remnants.

52. The project also envisages giving out the compensations for land plots, premises and plantations within the ROW (complete implementation of the LARP).

#### **Earthworks**

53. Fill volume –285,080 m<sup>3</sup>.

Cut volume - 114820 m<sup>3</sup>

Spoil to be disposed –95,330 m<sup>3</sup>

Filling materials to be transported from quarries and borrow pits for arrangement of the embankments - 285,080 m<sup>3</sup>

54. The volumes of earthwork according to the kilometers and types of treatment are given in the kilometer-based spreadsheets of earthworks.

55. The project envisages scattering and leveling of the vegetation ground layer over the fill slope and seeding perennial grass.

#### **Blasting works**

56. No blasting works are envisaged during the construction of Tbilisi-Ponichala section of Tbilisi-Rustavi road.

#### **Removing the topsoil**

57. Prior to making the subgrade, the project envisages cutting the humus soil layer for 15 cm from 19,490 m<sup>3</sup> in total and further using it to seed perennial grass over the fill slope.

#### **Waste Generation**

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

59. Milling of the existing asphalt concrete pavement shall be done prior to the construction of roadway. About 11,880 m<sup>3</sup> of milled asphalt should be stored in reserve and reused for construction of the road pavement.

#### **Waste Classification**

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

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

#### **Inert building materials.**

61. Generally, the major proportion of the remains generated in the road construction process is inert debris - fill of the cut ground and clastic rocks, and debris not used for construction purposes and subject to placement. The total amount of inert building materials generated during the construction of the design road section, is little as compared to other road sections:

- The mill of the existing pavement layer - 11,880 m<sup>3</sup>(must be placed as a reserve and further used for asphalt pavement or repairs of other road sections)
- Only a part of the ground generated in the section cuts will be used to make the fills. At least 95,330 m<sup>3</sup> spoil and cliffy material will be disposed off.

The sites of placement of inert waste will be selected by the construction contractor in agreement with the local authority.

## **2.10 Equipment Use During Construction**

62. Table - 2.2 provides a list of the typical equipment that will be used to construct the highway. 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 2.2 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	Fully Automatic Batching Plant	1
13	Fully Automatic Hot-Mix Plant	1
14	Paver Finisher with Electronic Sensor	1
15	Compressor	2
16	Mobile Generator	2
17	Water Tank with sprinkler	2
18	Crane	1
19	Concrete Paver With Electronic Sensor	1

## **2.11. A complex of auxiliary building objects**

63. The construction contractor will make a decision in connection to the auxiliary building objects (structure, content, location, designing, etc.). Despite this, by considering the existing experience in carrying out the construction works along other sections of E-60 road, we suppose there will be a complex of auxiliary building objects built, including a construction camp to place 200 workers

(covering approximately 1.5 ha area), transport and equipment yard for 100 vehicles and 150 heavy techniques (covering approximately 2 ha area) (bulldozers, excavators, cranes, etc.).

64. Decision on construction of the Concrete Production Plant will be taken by construction contractor: he may chose to use existing suppliers of concrete or install his own concretemixing plant.

In chapter 8.1.1.13 of EIA related to the mitigation measures, we described the procedures and conditions used to design and operate the above-mentioned building objects, as well as variants of optimal locations.

## **2.12 Quarries**

65. Identification of qauerries and borrow pits is responsibility of the Civil Works Contractor (Contractor). Before start up 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 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. Detailed information related to these quarries and filling materials produced are given in Annex 4.





Figure- 2.10 Quarries and Borrow Pits in Project Area

## 2.13 TRAFFIC MANAGEMENT DURING CONSTRUCTION

66. 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 interchanges where the local traffic is concerned.

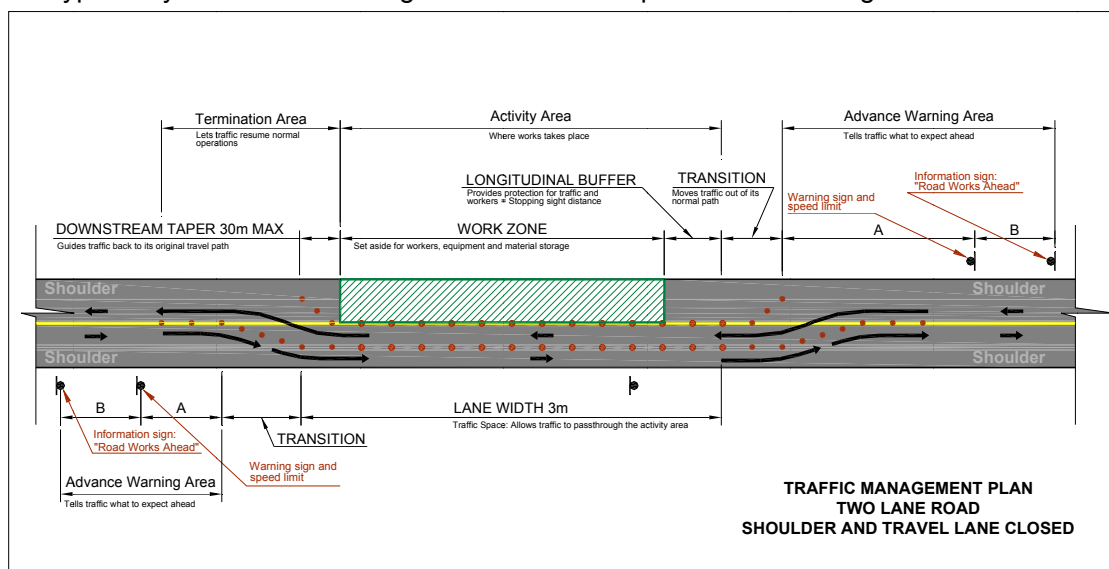
67. The frequency of crashes in work zones is disproportionately higher than at other locations. Therefore the primary consideration in work zone traffic control is safety. If driver can easily understand the traffic control and have adequate time to make decisions, they will operate their vehicle in a safe manner.

68. Maintaining the full carrying capacity is usually not possible during construction periods. As construction progresses, travel lanes are either narrowed, closed or rerouted. Due to the excessive traffic volumes on the project road sections at the design interchanges, lane closures might not be considered to maintain traffic completely out of the construction area. Lane closures on 2-lane road will generally require shifting traffic to the shoulder or provide traffic for both lanes on a 1-lane roadway.

69. For the higher trafficked road sections shifting traffic to the shoulder should be considered, whereas for the other project road sections the use of alternating traffic on 1-lane roadways may be acceptable.

70. Traffic shifting is one of the least disruptive work zone strategies since the same number of lanes are retained and narrow lanes, while reducing speed, have minimal effect on capacity. Utilization of the shoulder as temporary traffic lane in order to maintain the same number of lanes requires that the shoulder pavement is able to adequately support anticipated traffic loads. Re-gravelling and sealing of the existing shoulder is required to sustain the traffic load during construction and permit the safe movement of traffic at a reasonable speed. Adequate signing must be provided to guide drivers to the temporary shoulder lane.

The typical layout of traffic shifting to the shoulder is presented in the figure below.



**Fig. 2.11 Traffic Management During Construction**

71. 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**

72. 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 1 and section 3). 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**

73. Annex 1 describes in detail 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. 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**

74. 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.

75. 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.

76. 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).

**77. 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.

**78. 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.

79. 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.

80. 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.



81. 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**

82. Below is the list of laws relevant to environmental protection:

1994	Soil Protection
1996	System of Protected Areas
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**

83. 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**

84. 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 stationary 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**

85. 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 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**

86. 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.

87. 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".

88. 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**

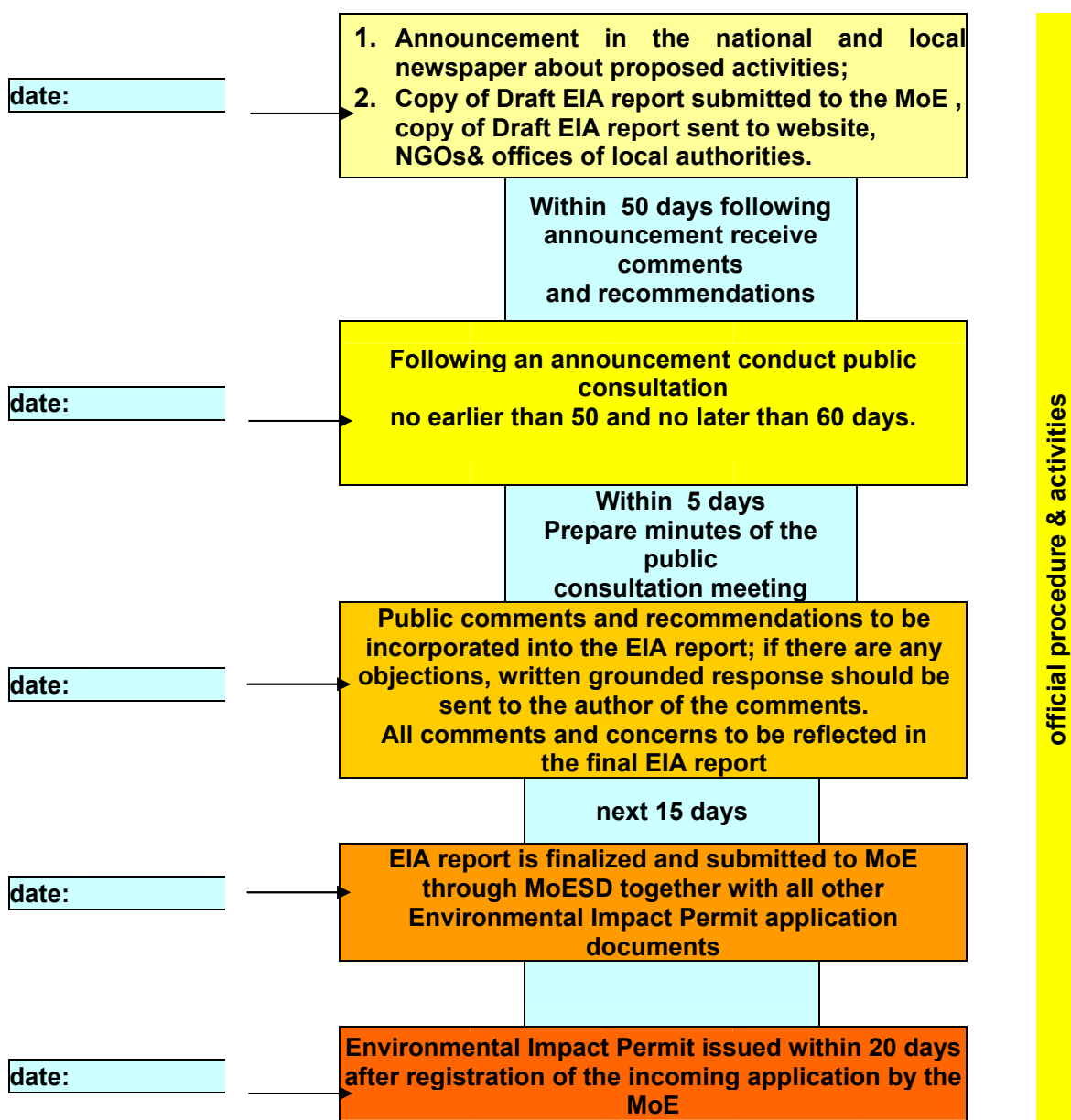
The Environmental impact assessment report should include the following information:

- (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**

89. 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)**

90. According to ADB Safeguard Policy Statement (2009) and Operational Manual FI (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 FI) based on the most environmentally sensitive component. Categories are as follows:

91. **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.

92. **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).

93**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.

**94. 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

95. 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 comments are disregarded.	Consider all comments from Bank and public. Agree with the Bank on each 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

96. 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.

97. 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)**

46. The Ministry of Environment Protection is responsible for all environmental protection issues in

Georgia except natural resources which under the recent changes in 2011 are subject of regulation by Ministry of Energy and Natural Resources of Georgia (MoEP). The responsibilities of the Ministry as the competent authority are:



- To intermit, limit, or stop any activity having or likely to have adverse impact on the environment.
- To issue a series of licenses and permits (including for environmental impact).
- To control the execution of mitigation measures by the developer.
- To receive free and unrestricted information from the developer monitoring systems, waste management etc.

47. Connected with projects of the actions presented to ecological examination, department of the mentioned ministry of ecological examination and, examine, organizes discussion of an estimation of influence on environment and prepares the documentation (the project of the order of the minister) to let out the permission to influence to environment. This department is obliged to control realization also.

Agency of Protected Areas: This Agency is responsible for state reserves, national parks, natural monuments, managed reserves, protected landscapes, biosphere reserves, world heritage districts and wetlands of international importance. The main tasks of the agency are to control territories of multilateral usage, to implement activities of looking after protected areas, to supervise, preserve, rehabilitate and protect them.

48. National Environmental Agency (established 29 August 2008) is responsible for preparing informational documents, forecasts and warnings regarding to existing and expected hydro-meteorological and geodynamic processes, also environment pollution conditions in order to provide state security, existing and expected hydro meteorological forecasting of rivers, water reserves and the Black Sea territorial waters, to provide civil aviation with meteorological inform

### **3.6.3 Ministry of Economy and Sustainable Development (MoESD)**

49. 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**

50. 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.

51. 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**

52. 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 recognised 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 ecoregions (WWF);  
One out of 221 endemic bird habitats (Bird Life International);  
One of the World Agro biodiversity Centers.

### **3.7.2 The Convention on the Conservation of Migratory Species of Wild Animals**

53. The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range. It was signed in 1979 in Bonn (Germany.) Georgia ratified the treaty in 2000 together with its three agreements:

- Agreement on "Protection of Populations of European Bats" (EUROBATS);
- Agreement on "Conservation of Cetaceans of the Mediterranean Sea, Black Sea and Contiguous Atlantic Area "(ACCOBAMS);
- Agreement on "Conservation of African-Eurasian Migratory Water birds" (AEWA).

54. Taking into account, that the Agreements have been initially designed as an instrument for facilitating the implementation of the CMS, the compliance with and enforcement of CMS in Georgia is mostly reflected in implementation of the Agreements.

### **3.7.3 Convention on Wetlands of International Importance**

55. The Convention on Wetlands of International Importance, also called the Ramsar Convention aims to provide the framework for national action and international cooperation for the conservation and sustainable use of wetlands and their resources, especially as waterfowl. The convention was developed and adopted by participating nations at a meeting in Ramsar on February 2, 1971, and came into force on December 21, 1975. It entered into force on July 06, 1997 in Georgia.

### **3.7.4 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**

56. CITES is one of the largest conservation agreements in existence, it is an international agreement between governments. The conventions aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival and it accords varying degrees of protection to more than 33,000 different species of animals and plants. The text of the convention was agreed upon in 1973, and CITES entered into force on 1 July 1975. The



date of accession for Georgia was September 13th, 1996 and the agreement entered into force on December 12, 1996 in Georgia.

## 4. DESCRIPTION OF THE ENVIRONMENT

### 4.1. Physical Resources in Project Area

#### 4.1.1. Climate

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:

**Temperature.** The average annual temperature is 12.7°C. The temperature of the coldest month (January) is +0.9°C and that of the hottest months (July-August) is +24.4°C, while the absolute maximum is +40°. The soil freezing depth is 5 cm.

**Atmospheric precipitations.** The average and annual precipitations is 505 mm. The most rainy months and May and June, with the average precipitation amount of 86 mm and 72 mm, respectively. Average annual humidity is 66%. Snow cover appears on December 30 and disappears on March 1. The maximum of daily precipitations is 130 mm. Intense rains are frequent in Tbilisi with about 5 occasions a year on average.

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

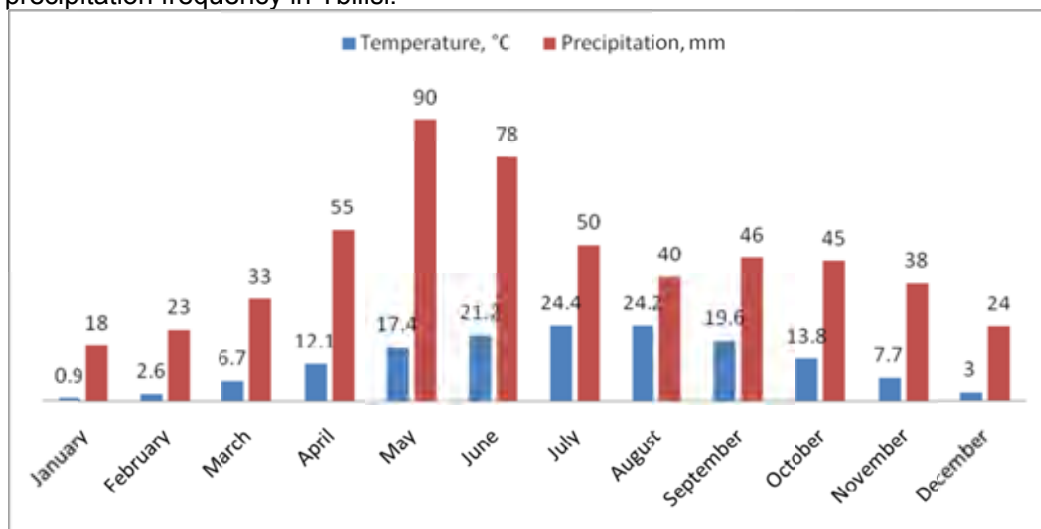


Diagram 4.1a. Average monthly temperature and precipitation frequency in Tbilisi

Table 4.1b Climatic data for Tbilisi

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.4.1.1 Duration of sunshine (hours)

m o n t h s												Annual Total
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
10 4	11 0	14 9	17 0	21 1	25 3	27 2	26 4	20 6	17 0	11 0	93	2112

Fig. 4.1.2 Air temperature °C

M o n t h s												Average Annual	Annual Ampli- tude
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
0.9	2.6	6.6	11.9	17.3	21.1	24.4	24.2	19.6	13.8	7.6	2.8	12.7	23.5

Fig.4.1.3 Absolute minima of atmospheric temperatures °C

M o n t h s												Annual
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
-23	-14	-13	-4	1	7	9	9	1	-5	-7	-19	-23

Fig. 4.1.4 Absolute maxima of atmospheric temperatures °C

M o n t h s												Annual
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
18	22	29	32	35	38	40	40	38	33	27	22	40

Fig. 4.1.5 Soil surface temperature °C

M o n t h s												Annual
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
0	3	8	15	22	27	31	30	23	15	7	2	15

Fig. 4.1.6 Absolute maxima of soil surface temperatures °C

M o n t h s												Annua
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
27	34	48	55	64	69	70	69	62	51	36	28	70

Fig. 4.1.7 Absolute minima of soil surface temperatures °C

M o n t h s												Annual
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
-26	-16	-15	-6	-1	6	8	8	-1	-8	-13	-22	-26

Fig. 4.1.8 Annual repetition of wind directions

c a r d i n a l   p o i n t s								
Nth	Nth/E	E	Sth/E	Sth	Sth/W	W	Nth /W	Calm
26	3	4	25	8	2	4	28	33

Fig. 4.1.9 Wind speed (m/sec)

M o n t h s												Average Annual
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
2.2	2.7	2.8	2.8	2.5	2.5	2.8	2.3	2.1	2.0	1.7	1.8	2.4

Fig. 4.1.10 Mean number of strong wind days ( $\geq 15$ m/sec)

M o n t h s												Annual
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
2.0	2.2	2.9	2.5	1.4	1.1	1.0	1.1	1.0	1.0	1.2	1.3	19

Fig. 4.1.11 Average atmospheric precipitation (mm)

M o n t h s												Annual
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
16	22	31	52	86	72	48	37	42	42	35	22	505

Fig. 4.1.12 Maximal atmospheric precipitation (mm)

M o n t h s												Annual
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
68	87	88	130	198	220	175	203	179	139	126	83	767

Fig. 4.1.13 Minimal atmospheric precipitation (mm)

M o n t h s												Annual
-------------	--	--	--	--	--	--	--	--	--	--	--	--------

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
0	0	1	5	5	3	1	0	1	4	1	0	241

Fig. 4.1.14 Maximum daily precipitation

M o n t h s											
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
23	27	30	43	10 9	12 6	80	14 7	77	57	75	46

Fig. 2.1.15 Relative air humidity (%)

M o n t h s												Average Annual
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
73	69	66	62	64	60	56	57	64	73	77	76	66

Fig. 4.2.1.16 Air absolute humidity (mb)

M o n t h s												Average
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
5.2	5.4	6.1	8.6	12. 4	14. 8	17. 2	16. 7	14. 2	11. 0	8.2	5.9	10.5

#### 4.1.2 Air Quality

##### The available data on the air quality in Tbilisi

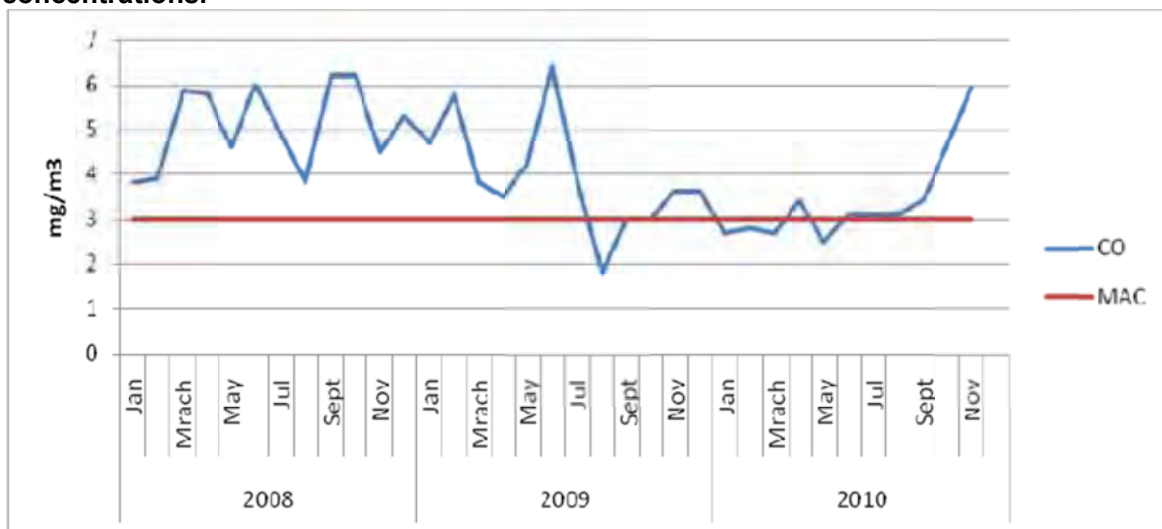
At present the National Environmental Agency monitors the air quality in Tbilisi in three points located in Agmashenebli, Tsereteli and Moscow avenues. The last two ones were installed in 2009 and at present only CO and SO<sub>2</sub> concentrations are measured. The observation point at Agmashenebeli 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 (NO<sub>2</sub>), lead (Pb) and low level ozone concentrations.

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

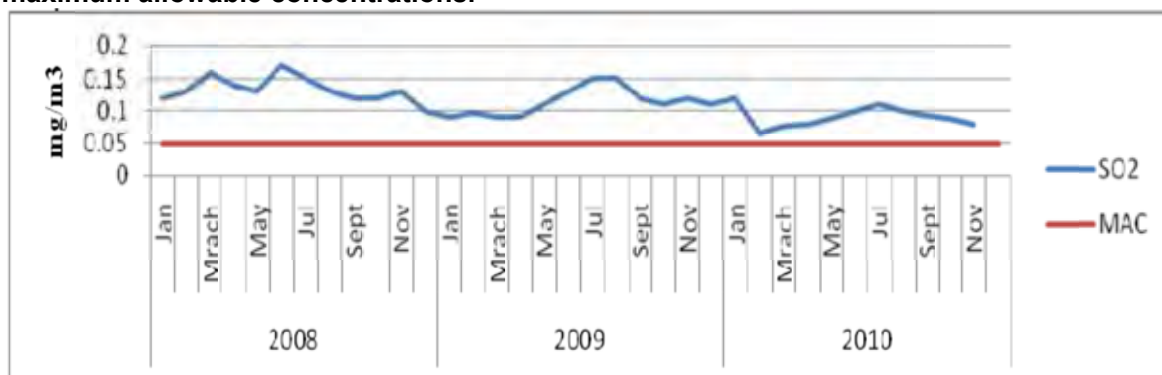
**4.2 Chart. Average monthly concentrations of particulate matter (PM) measured in Agmashenebeli Avenue in 2008-2010. They are compared with the average daily maximum allowable concentrations.**



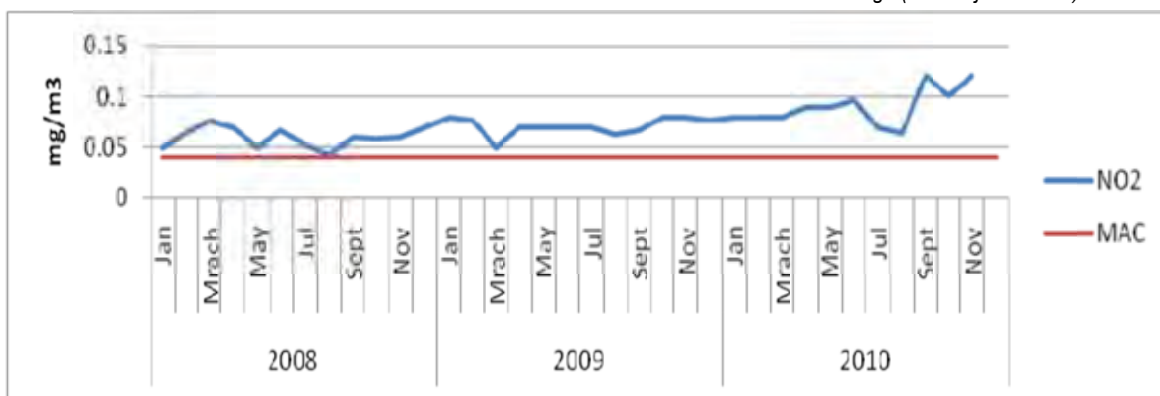
4.3 Chart. The average monthly concentration of carbon oxide (CO) in Agmashenebeli Avenue in 2008-2010. They are compared with the average daily maximum allowable concentrations.



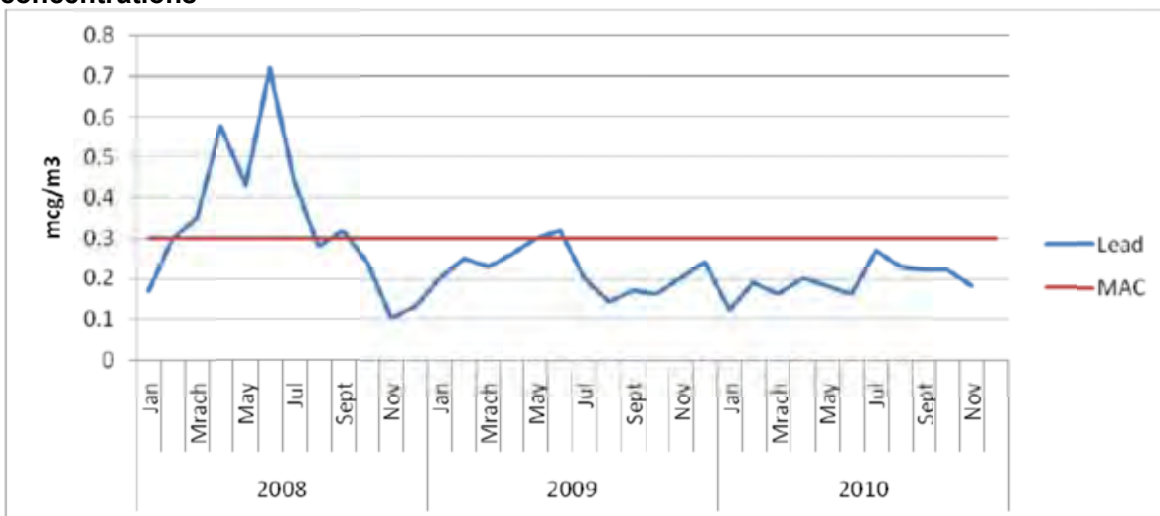
4.4 Chart. The average monthly concentration of sulphur dioxide (SO<sub>2</sub>) in Agmashenebeli Avenue in 2008-2010. They are compared with the average daily maximum allowable concentrations.



4.5 Chart. The average monthly concentration of nitrogen dioxide (NO<sub>2</sub>) 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, SO<sub>2</sub>, NO<sub>2</sub> 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 NO<sub>2</sub> concentrations in Tsereteli Avenue, where the traffic 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, NO<sub>2</sub> 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. The report of the Environmental Agency showing the results of the air sample analysis is given in Annex 2. 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) maximums admissible concentrations (MAC)**

№	Site of measurement	t°	Humidity %	Concentration mg/m <sup>3</sup>			
				Dust	CO	NO <sub>2</sub>	SO <sub>2</sub>
№ 3	Rustavi Highway (13,5km)	3.2	30	0.072	0.98	0.046	<0.1
№ 4	Rustavi Highway (17,7km) Rustavi entrance	3.6	34	0.104	1.66	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.



**Fig. 4.2 Air sampling sites**

#### 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.<sup>3</sup> 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 4.3. 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 4.4**

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

Time	Admissible average 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) than the value in Table 4.4.**

#### **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 CPН 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.

<sup>3</sup> Decree No. 297/N of August 16, 2001 of the Ministry of Labor, Health and Social Affairs “On approving the standards of environmental quality”



Fig. 4.3. Noise-measuring device PCE-EM882



Fig. 4.4 Device CPИ 6801

#### 4.1.5. Information about the surface watercourses and ground pollution

##### Existing information about the surface water quality

The surface water quality in Tbilisi and Georgia is monitored by the National Environmental Agency of the Ministry of Environmental Protection.

The monitoring usually takes place in three sections of the river Mtkvari: 1) Zahesi, at the entrance of the city, near Zemo Avchalhesi (Avchala hydropower station); 2) Vakhushti bridge, in the center of Tbilisi; 3) Gachiani, along the river Mtkvari lower reach, beyond the city limits. 33 major parameters are examined monthly on these sites. In addition, the National Environmental Agency ensures seasonal monitoring of microbial parameters near Ku lake.

A 10-year-long observation shows that the river Mtkvari in Tbilisi is mostly polluted with nutrients - ammonium ions, whose concentration at the three points of observation (above the reach, in the city center and below the reach) exceeds the maximum permissible standards of Georgia and European Union for several times. This is caused by the untreated sewage waters flowing into the Mtkvari threatening the trouble-free performance of the sewerage system and discharge water treatment plant. Another polluting substance for fish, sodium nitrite exceeds the maximum admissible concentrations fixed by EU only, but is within the limits of Georgian standards.

At the same places, particularly at Vakushti bridge and Gachiani (2008-09), high concentrations of biological oxygen demand (BOD-5) are fixed. On the other side, the concentrations of diluted oxygen meet Georgian and EU standards (admissible minimum) and are quite high for normal fish development what is presumably caused by relatively rapid flow and high water level. The concentration of other nutrients - sodium nitrites and phosphor ions is within the admissible norms.

The indicators of the water quality in the river Mtkvari in Tbilisi hydropower station section and river water regime in different phases are given in Table 4.5.

**Table 4.5. Water quality in the river Mtkvari in Tbilisi hydropower station section**

Water-bearing phase	pH	Ion content, mg/l								P mg/l	Si mg/l	Fe mg/l
		Ca <sup>2+</sup>	Mg <sup>2+</sup>	Na+K	HCO <sub>3</sub>	SO <sub>4</sub> <sup>2-</sup>	CL	NO <sub>3</sub>	NO <sub>2</sub>			
Winter low-water season	7.61	45.4	12.6	7.0	163.5	35.6	4.3	3.00	0.002	0.023	7.00	0.04
Spring flood	7.39	36.0	5.1	10.5	122.6	23.0	3.3	3.50	0.019	0.001	3.0	0.02
Summer low-water season	8.02	55.7	11.9	26.2	180.0	76.9	8.5	1.50	0.007	—	4.3	0.02
Autumn freshet	7.59	46.2	11.9	17.0	167.8	49.9	6.4	—	—	0.038	2.9	0.01

##### Project study data of surface water quality

The water sample of the river Mtkvari was taken near the starting site of the design road (in Krtsanisi Park, near km 11.00 of design road). At this site the road passes at a distance of 800 –

900m from the river. Besides, the samples were taken from a little stream flowing in a gorge near km13 of the road. The report of the Environmental Protection Agency showing the results of the surface water samples is given in Annex 3. Below, we give a brief summary.

**Table 4.6.**

**Design studies data on the pollution of soil with heavy metals**

#	Description	Maximum Admissible Concentration	Surface water at the entrance to Rustavi	From the gully along the route	Mtkvari (km11; Krtsanisi Park)
			N 41°35'55,3" E <sub>o</sub> 44°56'30,4"	N 41°36'17,0" E <sub>o</sub> 44°56'15,7"	N 41°37'09,5" E <sub>o</sub> 44°56'24,0"
1	Turbulence, NTU		1.49	1.21	1.58
2	pH	6.5-8.5	8.123	8.141	8.603
3	Diluted oxygen, mg/l	4 – 6	8.07	8.02	8.45
4	Hydrocarbonates, mg/l		222.0	192.8	173.2
5	TDS, mg/l		778.0	1491.0	274.0
6	Total nitrogen, N, mg/l		2.804	7.858	2.479
7	Total phosphate, mg/l		0.387	0.859	0.135
8	Chlorides, mg/l	350	159.7	77.9	19.37
9	Oil products, mg/l	0.3	0.063	0.042	0.012

#### Information about the ground pollution

Within the limits of Tbilisi and particularly, near the design site, no information about the ground pollution could be obtained. Therefore, we rely on the project study data only. The samples were taken near the proposed Camp site (km 13,5 of the design road) and at the Rustavi Entrance (km 17.8). Analysis to assess the pollution was made on heavy metals, particularly lead. The report of the Environmental Protection Agency showing the results of the ground sample analysis is given in Annex 3. Below, we give a brief summary.

**Table 4.7**

**Design studies data on the pollution of soil with heavy metals.**

#	Description	Rustavi highway (13,5km)	Entry to Rustavi (17,7km)
		N 41°35'54,3" E <sub>0</sub> 44°56'30,4"	N 41°33'50,2" E <sub>0</sub> 44°57'52,3"
1	Lead, Pb, mkg/g	42.33	18.2
2	Zinc, Zn, mkg/g	91.6	65.5
3	Cobalt, Co, mkg/g	12.69	12.5
4	Copper, Cu, mkg/g	98.6	90.9
5	Nickel, Ni, mkg/g	19.7	22.7

**Table 4.8**

**Tentative Allowable Concentration (TAC) of Heavy Metals in Soils of Various Physical-chemical properties (total content mg/kg)**

No	Pollutant	Soil Type	TAC considering the background	Aggregate condition of the Pollutant in Soil
	Nickel	a) sandy and sandstone b) acid soils (clay and loam) PHKCI<5,5. c) neutral and close to neutral (clay and loam) PHKCI<5,5,5,5.	20 40 80	Solid: as salts, sorbed, in the composition of minerals
	Copper	a) sandy and sandstone b) acid soils (clay and loam) PHKCI<5,5. c) neutral and close to neutral (clay and loam) PHKCI>(5,5.	132 33 66	Solid: as salts, sorbed organic-mineral compounds, in the composition of minerals
	Zinc	a) sandy and sandstone b) acid soils (clay and loam) PHKCI<5,5. c) neutral and close to neutral (clay and loam) PHKCI>(5,5	55 110 220	Solid: as salts, sorbed organic-mineral compounds, in the composition of minerals
	Lead	a) sandy and sandstone b) acid soils (clay and loam) PHKCI<5,5. c) neutral and close to neutral (clay and loam) PHKCI>(5,5	32 65 130	Solid: as salts, sorbed organic-mineral compounds, in the composition of minerals

#### 4.1.6. Topography and relief

Tbilisi is located in South Caucasus at 41°43' North latitude and 44°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 km<sup>2</sup>.

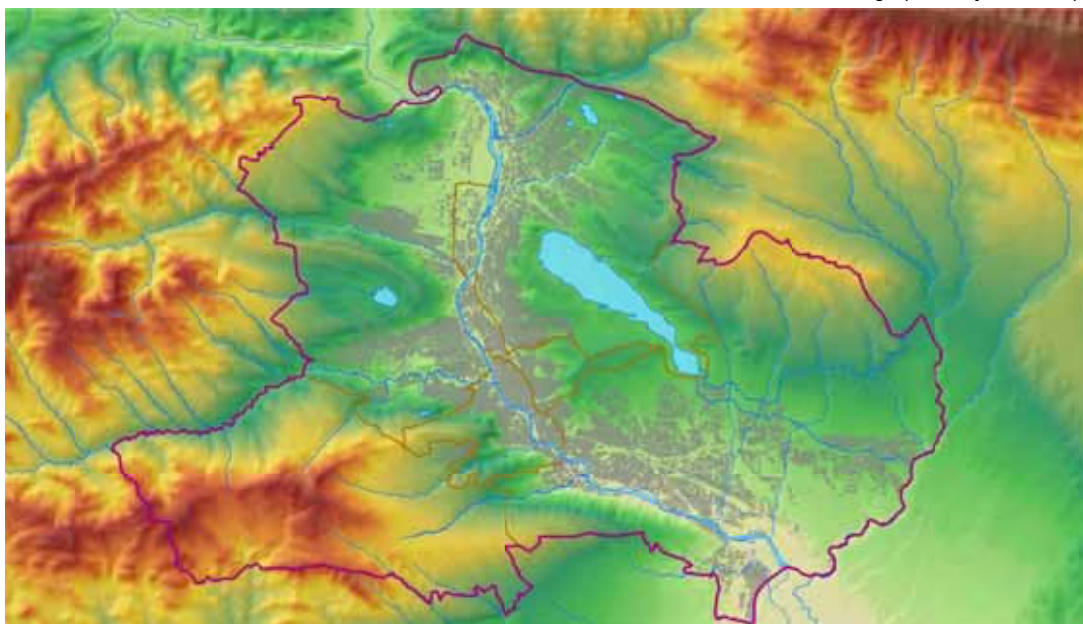


**Fig. 4.5 Topographic map of Tbilisi**

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.





**Fig. 4.6 Topography**

There are two zones of modern relief identified within the limits of the study area, in particular, the Lesser Caucasioni and Kvemo Kartli Plain. The former morphological element is represented as Teleti ridge, which is the south-eastern end of Trialeti Ridge and covers the extreme northern-eastern part of the study area (a small part of it). The height of Teleti ridge gradually reduces eastwards and over the settlement adjacent to Soganlugi it merges with the alluvial plain of the river Mtkvari. The subsidence of the ridge in the east results from the subsidence of the paleogenic stratum in the same direction. The ridge is asymmetric in shape with its northern slope inclined more ( $20-45^\circ$ ) than its southern slope ( $15-20^\circ$ ). A coincidence of the morphological form and tectonic structure is observed over Teleti ridge. In particular, its crest coincides with Teleti anticline. The crest section of the ridge is characterized by hilly relief with its absolute heights varying from 440 m to 606 m. The relative height of the northern slope of the ridge in relation to the river Mtkvari varies between 80-200 m.

Kvemo Kartli valley covers a significant section within the limits of the study area, which is presented as Asureti-Tsalaskuri plain and is located between Teleti and Ialguja ridges. The territory is presented by the terrace surfaces of the river Mtkvari (the I and II right over-floodplain terraces). The surface of the plain is inclined south-east (up to  $10^\circ$ ), towards the bottom of Ialguja ridge. On its part, the surface of the plain is slightly complicated with small gorges (Tsiviskhevi, Satirmatsaskhevi), flowing across the villages Soganlugi and Krtsanisi.

#### **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.

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.

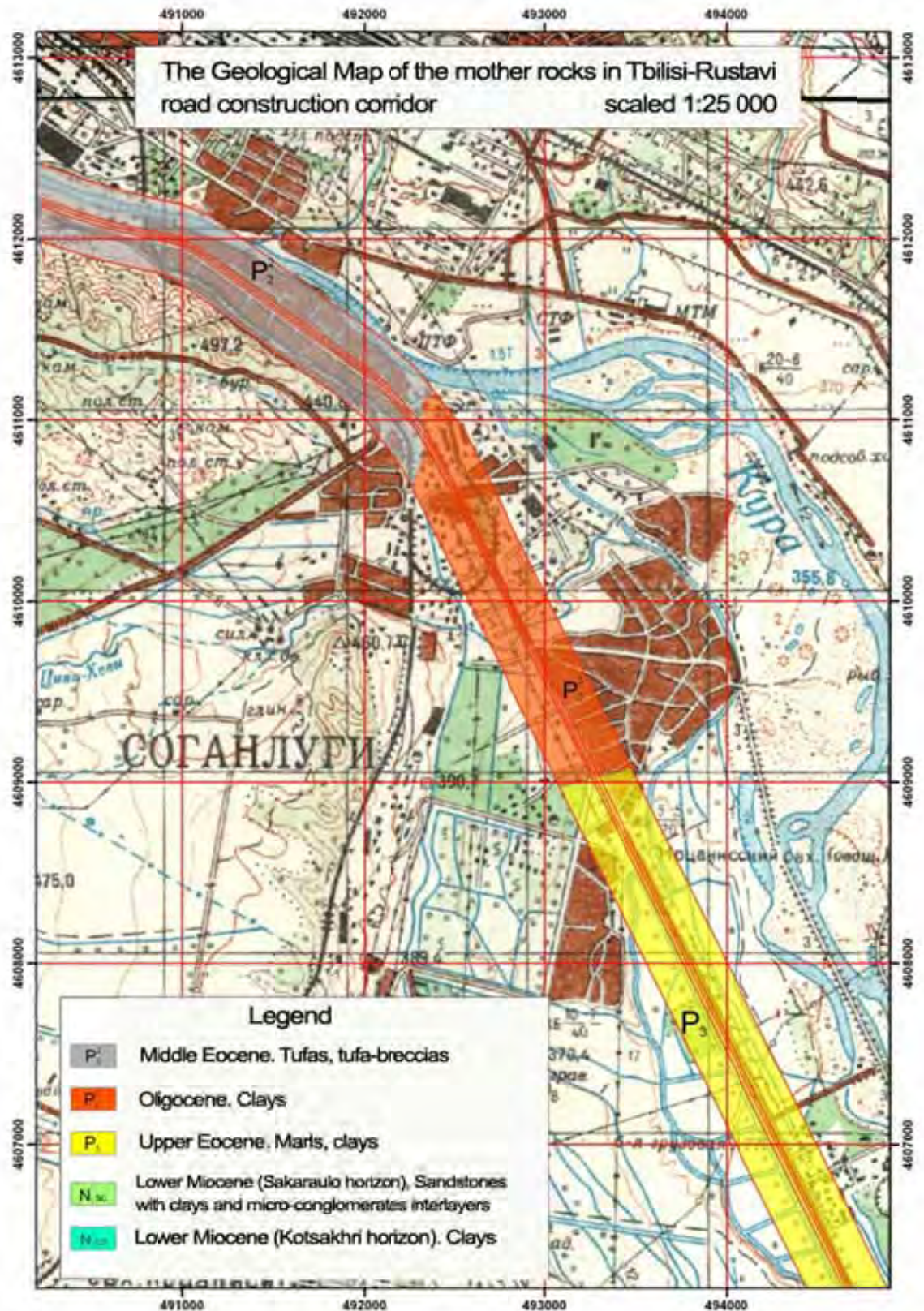


Fig. 4.7 Geological Map of Project Area



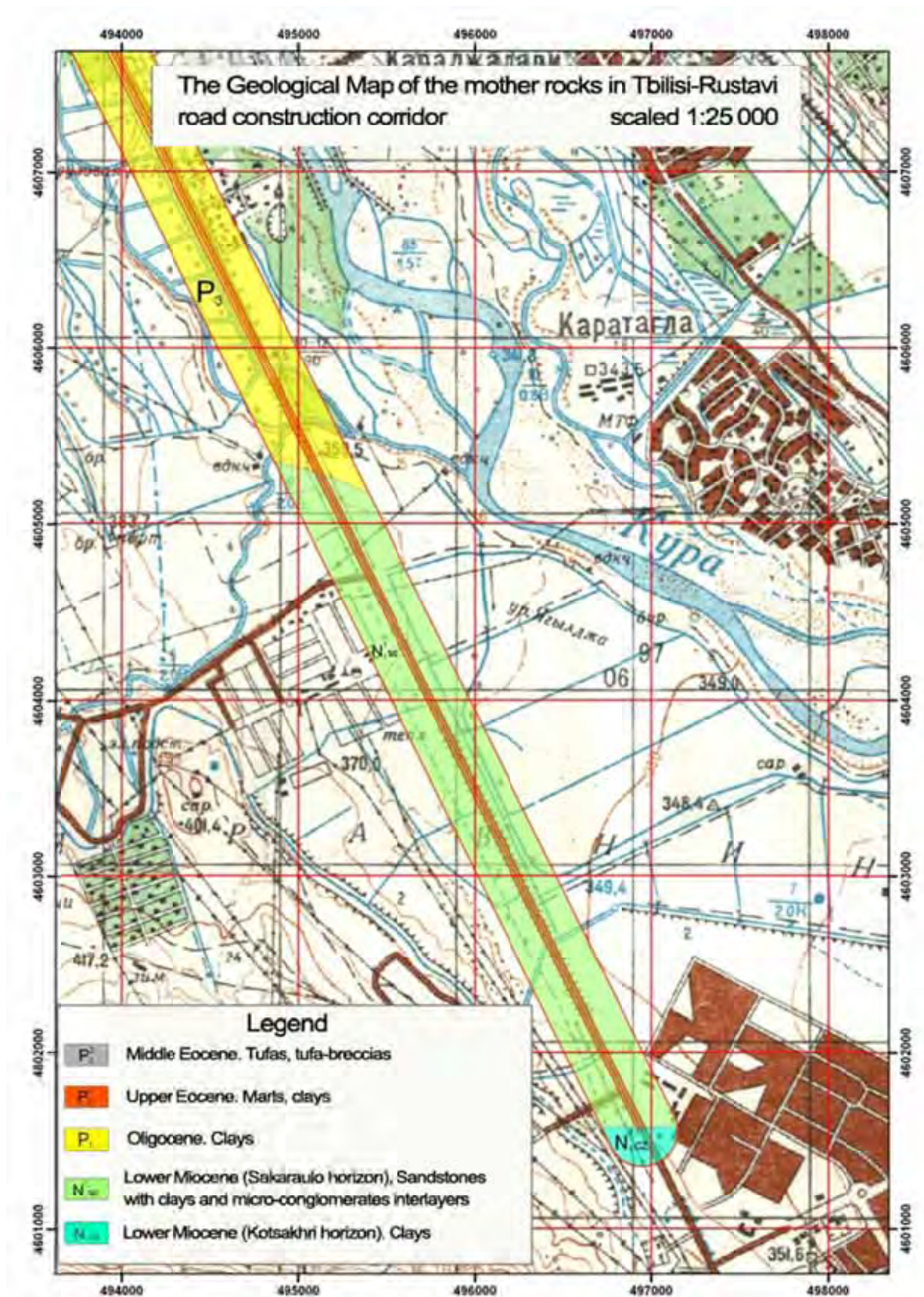
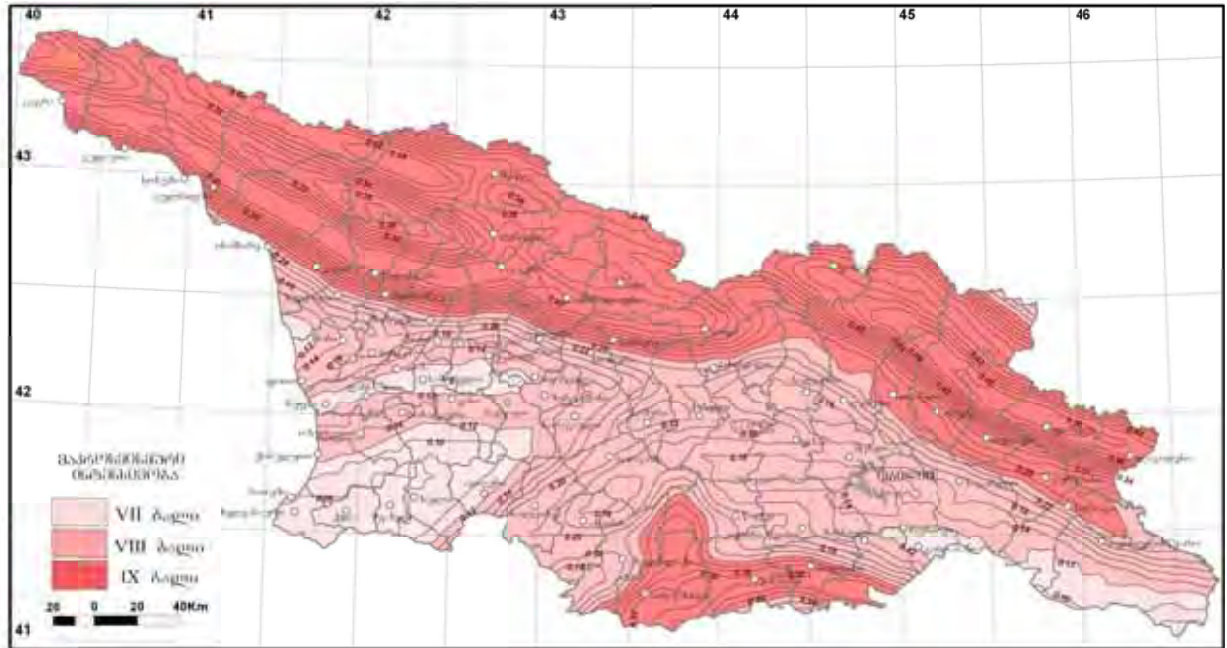


Fig. 4.8 Geological Map of Project Area

## Seismicity

The study area is located within the limits of Aspindza-Tbilisi morphostructural unit, which on its part is complicated by tectonic faults crossing one another. The zone is located within the high-risk area of seismicity. According to the macro-seismic zoning of Georgia, the study area belongs to point 8 seismic zone (Decree No. 1-1/2284 of the Minister of Economic Development of Georgia of October 7, 2009, Tbilisi "On approving building standards and rules - "Earthquake-resisting construction" (PN 01.01-09)). The settled areas in the study area, which are Tbilisi, Soganlugi and Rustavi, face the danger of point 8 earthquakes. According to the existing statistical data, high-magnitude earthquakes capable of significantly damaging the modern engineering structures (including the road) and impacting the morpho-dynamics of the relief, have occurred more than once historically as well as in the near past. Below, we give the existing statistical data.



**Fig. 4.9. Seismic Hazard Map indicating maximal horizontal acceleration and intensity**  
**Note: accelerations are given in "g" units.**

A 6-7-point earthquake in Tbilisi took place in the years of 1283, 1318, 1803, 1827, 1859, 1909, 1920 and 2002. According to the earthquakes occurred during the XX century, the duration of quakes varies between 2.1 and 3.6 seconds. The nature and direction of spreading the seismic waves mostly depend on the location of tectonic fault structures. The dominating direction (sub-lateral) of spreading of the seismic waves in the study area is northern-western-southern-eastern.

Below we give the characteristics of maximum horizontal accelerations of seismic waves (dimensionless coefficient of seismicity) for the settled areas within the limits of the study area:

1.  $0.17 \text{ m/sec}^2$  in Tbilisi
2.  $0.12 \text{ m/sec}^2$  in Rustavi
3.  $0.174 \text{ m/sec}^2$  in village Soganlugi.



## Hidrogeology

According to the hydrogeological zoning of Georgia (Buachidze I. (1979)), the study territory is located in the region of porous and fissure waters of Marneuli-Gardabani artesian basin of block Artesian basin of Georgia and in the region of fissure and fissure-karst waters of Tbilisi water-pressure system of water-pressure system of Adjara-Trialeti folded zone.

Two principal hydrogeological complexes may be identified within the limits of the study area: the water-bearing horizon of main rocks and the water-bearing horizon of Quaternary rocks. The water-bearing horizon of the main rocks is presented by Eocene, Oligocene and Miocene water-proof laguna-marine and volcanogenic deposits: tufas, tufa-breccias, clays, sandstones, marls, argillites. Out of the volcanogenic rocks of the Middle Eocene, there are rare fresh and cold water outcrops at the bottom of the gorge edges as seepage waters. An exception is the thermal waters of deep circulation in the rocks of the same age. According to their chemical content, the underground waters associated with the Middle Eocene rocks, are of two main types:

1. Thermal curing waters with their outcrops associated with tufogenic waters. With their chemical content, these waters are chloride-hydrocarbonate-sodium, with the mineralization of 0.25-0.34 gr/l and sulfate-chloride-sodium-calcium, with the mineralization of 0.68-0.87 gr/l. Their temperatures vary from 26 to 50°C.
2. Cold water outcrops, which are associated with volcanogenic rocks, are hydrocarbonate-calcium-magnesium, with the mineralization of 1.4 gr/l to 2.6 gr/l and sulfate-hydrocarbonate-calcium-sodium, with the mineralization of 0.6 gr/l. The temperature varies from 6 to 18°C. It should be noted that the underground waters of deep circulation of the Middle Eocene are characterized by high content of hydrocarbon of up to 12 mg/l. These waters often contain methane of up to 19.26-22% and nitrogen.

The deposits of Oligocene-Lower Miocene - clays, sandstones, marls, argillites are characterized by low collector properties. Even some sandstone species, containing carbonates, are in fact waterproof. The underground waters in these deposits mostly circulate above the local erosion section level and locally outcrop over the edges of watercourses (rivers, gorges), where they cross water-bearing layers of minor thicknesses. The flow of the springs is little (one-hundredth of litre per second), and the springs associated with fissure sandstones have a greater flow (up to 0.3 m/sec). The underground waters are of different chemical content, with their mineralization mostly depending on the content of gypsum in the rocks. The waters are sulfate, sulfate-hydrocarbonate, sulfate-chloride and sodium-calcium-magnesium with the general mineralization of 3.2-6.6 gr/l. They are characterized by high value of hardness (pH=7). Out of the rocks (alluvial, deluvial, proluvial) of the water-bearing complex structured with the Quaternary deposits, the high terraces of the river Mtkvari are mostly water-infused in the study area. The water outcrops associated with the given deposits are mostly of a little flow. With their chemical content, the waters are sulfate-hydrocarbonate and calcium-sodium-magnesium. Their general mineralization varies from 1.0 to 1.0 gr/l.

During the road construction and operation in fact no pollution of the underground waters along the road corridor is expected.

### 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**

Below we give the Averaged physical-mechanical (geotechnical) properties of the grounds structuring the study area.

The density of tufas is  $1.1 \text{ gr/cm}^3$ , their porosity is 7%, their softening ratio is 0.86, the angle of internal friction is  $37^\circ$ , the adherence is 170, the temporal resistance uniaxial strength (Rc) is 70, the modulus of deformation is 2, and the modulus of elasticity is 4.

The density of sandstones is  $2.30 \text{ gr/cm}^3$ , their porosity is 8%, their softening ratio is 0.77, the angle of internal friction is  $29^\circ$ , the adherence is 9, the temporal resistance uniaxial strength (Rc) is 100, the modulus of deformation is 4, and the modulus of elasticity is 10.

The density of clays is  $1.95 \text{ gr/cm}^3$ , their coefficient of porosity is 0.70%, their plasticity index  $>17$ , index of consistency is 0.0-0.25, the filtration coefficient  $<0.001$ , the angle of internal friction is  $20^\circ$ , the adherence is 0.60, the provisional estimate resistance (Rc) is  $5 \text{ kg}^{\text{force}}/\text{cm}^2$ , the modulus of deformation is 240, and the modulus of elasticity is 390.

The density of marls is  $2.30 \text{ gr/cm}^3$ , their porosity is 31%, their softening ratio is 0.81, the angle of internal friction is  $31^\circ$ , the adherence is 40, the temporal resistance uniaxial strength (Rc) is 50, the modulus of deformation is 2, and the modulus of elasticity is 5.

The density of argillites is  $2.0 \text{ gr/cm}^3$ , their porosity is 32%, their softening ratio is 0.30, the angle of internal friction is  $19^\circ$ , the adherence is 3, the temporal resistance uniaxial strength (Rc) is 10, the modulus of deformation is 2, and the modulus of elasticity is 4.

The density of loams is  $1.75 \text{ gr/cm}^3$ , their porosity is 05%, the number of plasticity is 10, the consistency index is 0.0-0.25, the filtration coefficient is 0.05, the angle of internal friction is  $21^\circ$ , the adherence is 0.25, the provisional estimate resistance is  $2 \text{ kg/cm}^2$ , the modulus of deformation is 190, and the modulus of elasticity is 340.

Shingle with boulder admixtures (5%) and sand-and-gravel filler. The density of the given ground is  $1.95 \text{ gr/cm}^3$ , the porosity coefficient is 0.60, the filtration coefficient is 50 m/day, the angle of internal friction is  $35^\circ$ , the adherence is 0.07, the provisional estimate resistance ( $R_0$ ) is  $6 \text{ kg}^{\text{force}}/\text{cm}^2$ , the modulus of deformation is 480, and the modulus of elasticity is 3800.

The constituent grounds of the road corridor are mostly characterized by favorable bearing properties and in fact no complications in this respect are expected during the road operation.

## **General description of the engineering-geological conditions of the road construction corridor with the indication of piquets (kilometers)**

The section of KP 04km+600m-KP 13km+00m runs within the borders of the I right over-floodplain terrace surface of the river Mtkvari. Most of the territory is populated, and a part of its ending is used as agricultural plots of field. The geology of the territory is participated by shingle of alluvial genesis with the admixtures of boulder and sand-and-gravel filler, which are covered with loams of different thicknesses. No hazardous geological processes are fixed on the given territory and no origination or activation of such processes is expected in the future. According to the complexity of the engineering-geological conditions, the given territory belongs to the I (simple) category.

The road construction corridor along the section of KP 13km +00m-KP 17km+800m (end of the study area), runs within the borders of the II over-floodplain terrace surface of the river Mtkvari (See Fig. 4). Most of the territory is cultivated as arable and sowing land (mostly pastures). The surface is in fact flat (slightly inclined towards the river Mtkvari). Along the contact surface of the I and II terrace surfaces, there runs a gully (See Fig. 5), which crosses the road by means of a branch pipe. The road along the given section is also crossed by Baku-Tbilisi-Ceyhan oil pipeline and South Caucasus pipeline. These will be taken into account during the road construction and operation. The geology of the territory is participated by shingle of alluvial genesis with the admixtures of boulder and sand-and-gravel filler, which are covered with loams of different thicknesses. No hazardous geological processes are fixed on the given territory and

no origination or activation of such processes is expected in the future. According to the complexity of the engineering-geological conditions, the given territory belongs to the I (simple) category.



**Fig. 4.10**



**Fig. 4.11**

The report is attached by a schematic map of zoning of the construction corridor of the design road and adjacent territories according to the engineering-geological conditions (degree of geological hazards), with three categories identified according to the given sign: sections of the I (simple), II (average) and III (complex) categories. The areas are categorized by considering different factors, in particular, by geomorphologic conditions; geological conditions – relation of the premises and communications to the geological environment; hydrogeological conditions; geological processes and their possible impact on premises and communications; presence of specific grounds and their impact on communications, etc.

The I (simple) category unites the territory located within one geomorphologic element, with its surface being horizontal and not dissectioned. In a geological respect, the territory is presented by no more than two lithological layers with their location being horizontal (or slightly inclined), or by rocky rocks, which be may covered with non-rocky rocks of a little strength, outcropping onto the surface. As for the underground waters, they are either absent, or presented by one



sharply expressed horizon and having a homogenous chemical composition. No hazardous geological processes or specific grounds (settling, swelling, etc.) are found here.

The II (average) category includes the territories, which are spread within the limits of several geomorphologic elements of a similar genesis, with their surfaces slightly inclined and dissectioned. In a geological respect, the territories are presented by no more than four lithological layers. The rocky rocks have uneven surfaces and are covered with non-rocky deposits. The underground waters are presented by two or more formed horizons and have different chemical composition. Hazardous geological processes are limited. As for the specific grounds, they do not play an important role in making a design decision.

The III (complex) category includes the territories, which are spread within the limits of several geomorphologic elements of different genesis, with their surfaces strongly dissectioned. In a geological respect, the territories are presented by more than four lithological layers with their strengths sharply varying. The rocky rocks are very much weathered and fissured. They are covered with non-rocky rocks. The horizons of the underground waters are not sharply distinct. Some areas are structured with alternating water-bearing and water-resistant rocks. Hazardous geological processes are widely spread, or the territory is potentially dangerous in respect of origination and activation of hazardous geological processes. The mentioned circumstances and existence of specific grounds are of a decisive importance when making decisions during the designing and building of new communications and in the exploitation phase.

## **Conclusion**

As a conclusion, we may say that in the final account, the study section of Tbilisi-Rustavi road, in respect of geological hazards, is in fact characterized by favorable engineering-geological conditions. However, along the section of KP 00km+600m-KP04km+600m, certain complications are expected during the road construction and operation, in particular rock falls and rock avalanches and no-large-scale landslide processes. The given circumstances will be necessarily considered under the project and as a result, the relevant protective measures will be developed (arranging the walls, regulating the surface waters, etc.).

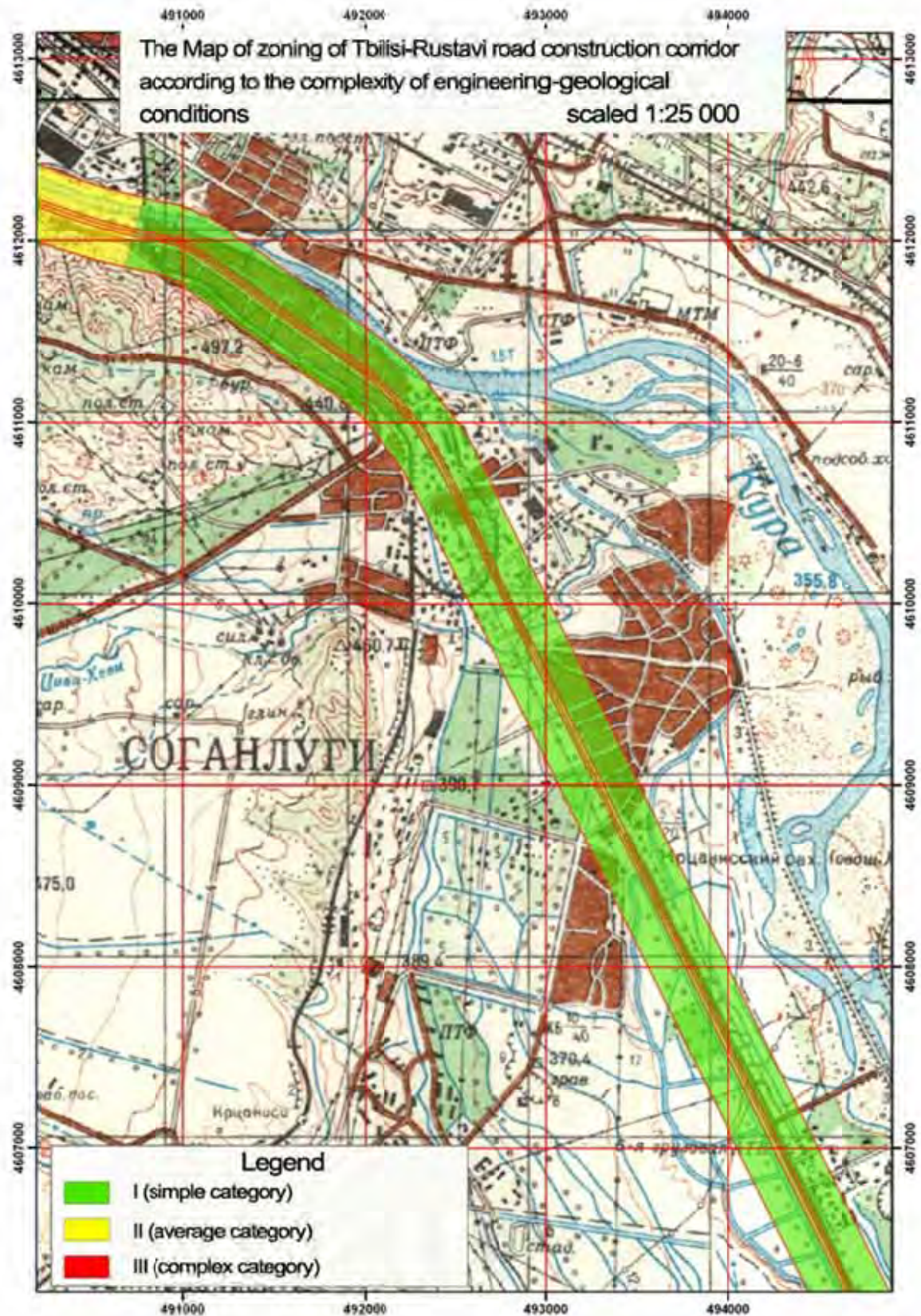


Fig. 4.12 Geotechnical Map of Complexity of the Geoengineering Conditions



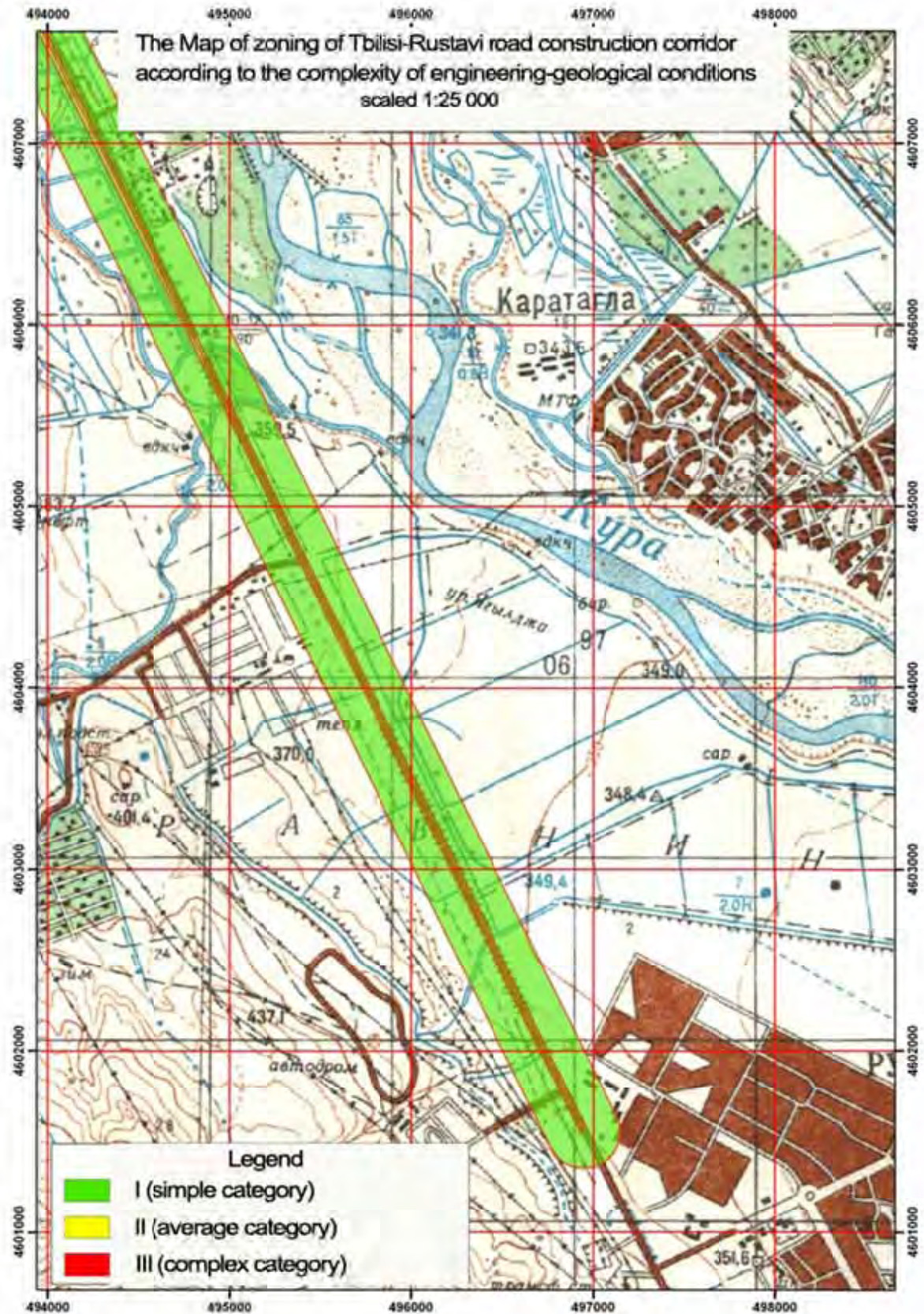


Fig. 4.13 Geotechnical Map of Complexity of the Geoengineering Conditions



## **4.1.9 Water Resources**

### **4.1.9.1 The river Mtkvari**

The bed of the river Mtkvari runs all along Tbilisi-Rustavi rehabilitation road. The river Mtkvari, the biggest river in South Caucasus, heads from the springs at the altitude of 2720 m above sea level on the northern slope of Kizil-Gyadik mount in Turkey and flows into the Caspian Sea on the territory of Azerbaijan.

The length of the river is 1364 km and the area of its catch basin is 188.000 km<sup>2</sup>. The length of the river across the territory of Georgia is 350 km. The hydrographic network of the river along this section is made up of 12211 rivers with the total length of 35465 km.

The basin of the river Mtkvari has an asymmetrical shape and covers Main Caucasioni ridge on the territory of Georgia, Somkhit-Javakheti high mountainous zone and intermontane tectonic lowland. The lowest part of the basin is the intermontane lowland, which is Kartli Plain.

The geology of the upper part of the river basin is presented by the rocks of a volcanic origin. The geology of the piedmont is presented by Paleozoic, Jurassic and Cretaceous sandstones and Eocene clays. The geology of Kartli valley is presented by Old and Modern alluvial deposits. There are brown and black soils spread along the river across the plain.

The vegetation cover of the basin above 2500 m altitude is presented by alpine vegetation, with a wide band of subalpine vegetation below. There is a mixed forest growing in the piedmont with dominating hardwood species. Kartli Plain is mostly cultivated with agricultural crops.

The river is fed with glaciers, snow, rain and ground waters. Its water regime is characterized by spring floods caused by seasonal snow melting and summer and winter relatively stable low-water periods. The most water-bearing period is spring with 47-58% of the annual water flow. The flow in summer is 22-27% and exceeds that in autumn or winter. In some years, spring floods coincide with freshets caused by rains and leads to catastrophically high water levels. The flood of April 18 of 1968 is a classic example of such a catastrophe, when the peak water level in Tbilisi exceeded 5-6 m above the normal level.

Low water levels and discharges are mostly fixed in winter. In this period, the icy phenomena are instable. The average number of icy days is 8-14 on average.

Along the rehabilitation road section, the river Mtkvari flows through a single, non-branched bed, with its banks protected with concrete dikes (KP 0+000 to KP 2+200).

The river Mtkvari is widely used for irrigation, power engineering and industrial water-supply purposes. The closest HPP plants are located upstream from project sites in Ortachala district of Tbilisi and in Zahesi (between Tbilisi and Mtskheta). The headworks 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.

### **4.1.9.2 Brief Hydrographic Characterization of Gorges Crossing Tbilisi-Rustavi Road**

The nameless gorges crossing the first section of Tbilisi-Rustavi road (from KP 0+500 till KP 7+000) start from the northern slopes of Teleti ridge between the altitudes of 785 to 525 m, while gorges crossing the following sections (from KP 7+000 till KP 17+800) – from the northern slopes of Iaghluji ridge within the same altitudes. The majority of the mentioned gorges join r. Kura from the right side, while some of the gorges spread on the right terrace of r. Kura and disappear within the terrain until crossing the rehabilitation road. Part of the small gorges fall into the “water household” irrigation channel running parallel to the rehabilitation road. The channel does not function at present.

The geology of the dry nameless gorge basins is composed of the Quaternary period deposits, which are covered with loamy soils. Gorge basins are stripped of forest cover. Only thin shrubbery and grasses are present from vegetation here. The beds of the gorges from Iaghluji ridge are utilized through industrial areas and agricultural crops on the right terrace of r. Kura after crossing Tbilisi-Rustavi road.

The gorges are dry the most part of the year. Water flows in the gorges only in the period of intensive rain and melting of the thin snow cover. Discharges and levels of the flash floods caused by rain significantly exceed the same values caused by snow melting.

Gorges crossing rehabilitation Tbilisi-Rustavi road have not been studied in hydrological terms. Hence, the values of maximal water discharges of these gorges crossing the rehabilitation road are identified using the method given in the "Technical Instruction for Calculation of the Maximal Discharge of Rivers in Conditions of Caucasus."

According to the mentioned method, the values of maximal discharge of those rivers and gorges, the area of the water catchment basin of which does not exceed 400 km<sup>2</sup>, are calculated with the below formula:

$$Q = R \cdot \left[ \frac{F^{2/3} \cdot K^{1,35} \cdot \tau^{0,38} \cdot \bar{i}^{0,125}}{(L + 10)^{0,44}} \right] \cdot \Pi \cdot \lambda \cdot \delta \text{ m}^3/\text{sec}$$

Where R – it is the rayon parameter. Its value in Eastern Georgia is deemed as 1.15;

F – the area of the water catchment basin in cross-section for calculation in km<sup>2</sup>;

K – climate rate of the rayon, the value of which is taken from special map and in our case is 5;

$\tau$  – recurrence in years;

$\bar{i}$  – leveled inclination of the river flow or gorge in units from the starting point till cross-section for calculation in km;

$\Pi$  – rate of characteristic of soil cover in the river basin. Its value is taken from a special map and respective table;

$\lambda$  – rate of the basin forestation, the value of which is calculated as follows:

$$\lambda = \frac{1}{1 + 0,2 \cdot \frac{F_t}{F}}$$

Where  $F_t$  – the area of forested basin in %;

$\delta$  – rate of basin form, the value of which is calculated as follows:

$$\delta = 0,25 \cdot \frac{B_{\max}}{B_{\text{sas}}} + 0,75$$

Where  $B_{\max}$  – the maximal width of the basin in km;

$B_{\text{sas}}$  – average width of the basin in km, the value of which is calculated by

$$\text{relation } B_{\text{sas}} = \frac{F}{L}.$$

During the calculation of the maximal discharge of those small gorges, the area of the water catchment basin of which is less than 5 km<sup>2</sup>, the below specially processed rates corresponding to the areas of the water catchment basins are introduced in the above formula:

$F \text{ km}^2$	<1	1	2	3	4	5
$K^1$	0.70	0.80	0.83	0.87	0.93	1.00

The values of morphometric elements required for the calculation of the maximal water discharge of the gorges crossing the rehabilitation road are identified using 1:25000 scale topographic map as well as the values of the maximal water discharge for recurrence of 100 years, 50 years and 10 years. The values are given in the below Table #1.

Morphometric Elements and Maximal Water Discharge in  $M^3/\text{Sec}$  for the Gorges Crossing the Rehabilitation Road

Table #1

Gorge # or name	$F$ $\text{km}^2$	$L$ $\text{km}$	$i$ $\text{kal}$	$\Pi$	$K$	$\lambda$	$\delta$	$K^1$	Maximal discharge			
									$\tau = 100$ years	$\tau = 500$ years	$\tau = 200$ years	$\tau = 100$ years
15	32.2	14.6	0.022	1	5	1	1		87.3	67.1	47.4	36.4
16	4.50	4.00	0.036	1	5	1	1	0.96	30.5	23.4	16.5	12.7
17	1.53	3.00	0.086	1	5	1	1	0.82	14.5	11.2	7.89	6.07
18	1.88	2.20	0.137	1	5	1	1	0.83	18.5	14.2	10.0	7.71

Gorges crossing Tbilisi-Rustavi rehabilitation road are given on 1:25000 scale topographic map according to the numbering given in Table #1.

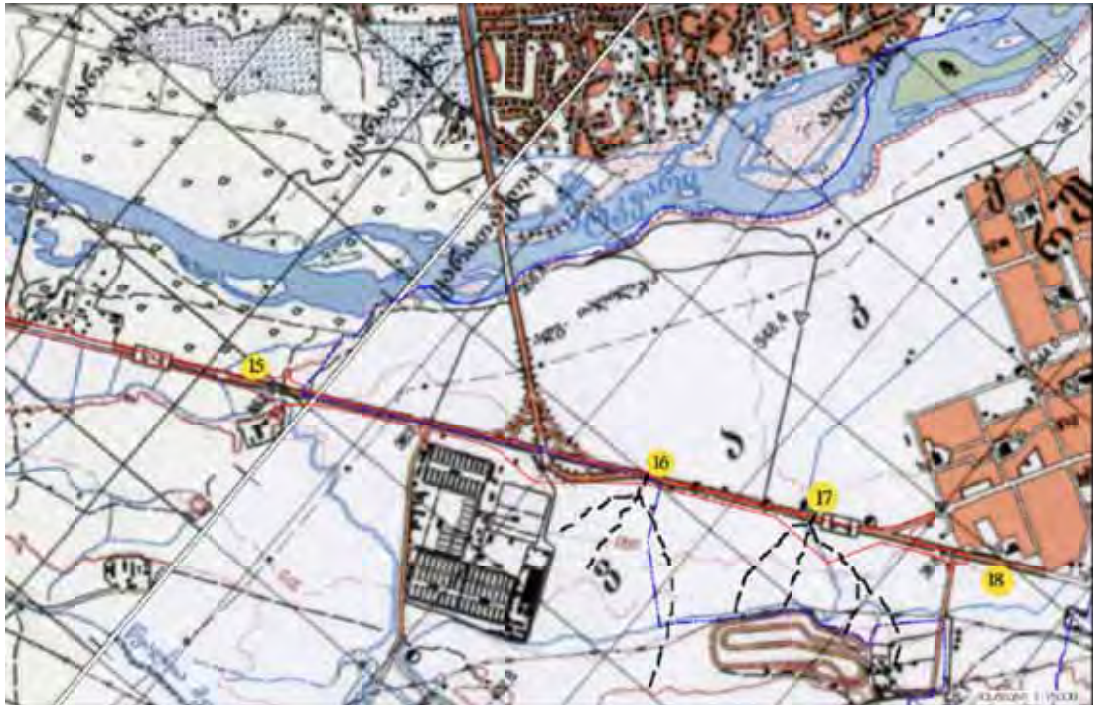


Fig 4.14 Gorges crossing the project road

In addition to the gorges crossing the rehabilitation road, r. Kura maximal annual discharges have also been identified for Tbilisi-Rustavi section. The analogue method is used for the determination of the maximal discharges of r. Kura within Tbilisi-Rustavi section. The data of r. Kura – hydrological point Tbilisi are taken as analogue. The data comprises 66 years of observations (1925-1990). Within the mentioned period the maximal discharges of r. Kura in hydrological point Tbilisi cross-section had fluctuated from  $448 \text{ m}^3/\text{sec}$  (1947) to  $2450 \text{ m}^3/\text{sec}$  (1968).

In The variation row of maximal water discharges within 66 years of hydrological post in Tbilisi cross-section for r. Kura have been statistically processed following СНП requirements 2.01.14-83 using the method of moments. As a result of the processing, the below parameters of distribution have been received:

The average perennial value of maximal discharges  $Q_0=1162 \text{ m}^3/\text{sec}$ ;

Variation rate  $C_v=0,31$ ;

Asymmetrical rate value  $C_s=4C_v$ , which is received through the closest empirical and theoretical point coincidence on the probability cell.

Assessment parameters of representativeness of the variation range of observations have been determined – relative average square error of the average perennial maximal discharge value



and variation rate, which lies within acceptable limits. The average square deviation has also been identified and is  $\delta=360$ .

From the received parameters and ordinates of three parameter gamma-function the maximal discharge of various supply waters of r. Kura has been calculated. The maximal discharges of various supply waters have been identified through Gumbel method as well, during which the recurrence rate K for extreme values (according to Gumbel distribution) is selected through specially processed table according to observation period (in our case 66 years).

The maximal discharges of r. Kura in Tbilisi are calculated on the basis of individual catastrophic maximal discharges determined by the Institute of Hydro-Meteorological Scientific Research as well. According to the mentioned calculations the below parameters of the distribution function have been identified:

Average perennial value of maximal discharges:  $Q_0=1148 \text{ m}^3/\text{sec}$ ;

Variation rate  $C_v=0,56$ ;

Value of asymmetry rate  $C_s=2C_v=1,12$ .

Through the received parameters and binominal distribution function ordinates values of various supply of r. Kura are determined.

The values of the various supplies of maximal discharges of r. Kura in Tbilisi hydrological post cross-section according to the determined three parameter gamma-distribution, Gumbel distribution and the Institute of Hydro-Meteorology are given in Table #2.

R. Kura – Hydrological Point Tbilisi  
Maximal Water Discharges  $Q \text{ M}^3/\text{Sec}$

Table #2

Supply P%	0,1	1	2	5	10	20
Gamma-distribution	3030	2300	2140	1835	1630	1425
Gumbel distribution	3100	2395	2185	1900	1680	1500
Hydro-meteorological Institute	3480	2910	2765	2475	2270	2060

The maximal discharges of r. Kura identified by the Institute of Hydro-Meteorological Scientific Research of Georgia are accepted as calculation values for hydrological point Tbilisi cross-section.

As there is fairly insignificant difference between the water catchment basins of hydrological point Tbilisi cross-section and Tbilisi-Rustavi rehabilitation road section, the maximal discharges of r. Kura identified for hydrological point Tbilisi cross-section are deemed as calculation values for Tbilisi-Rustavi rehabilitation road section.

## 4.2 Ecological Resources – Landscape and Flora

### 4.2.1 Landscape and Soils

Landscapes of Tbilisi are diverse. Many regions of specific landscape border each other in the surroundings of Tbilisi. Due to this particular components of landscapes and the whole landscape itself are so diverse. Plain and hilly part of Tbilisi 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 Tbilisi.

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 Tbilisi and its surroundings are of various types. There are grey-brown, meadow grey-brown, humus-sulphatic, alluvial, saline, alkali, forest brown and black soils. Erosion processes are observed in the surroundings of Tbilisi. 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 Tbilisi there are soils cultivated to different degree. This soil has lost its natural shape and now represents a cultural variation of the original soil.

#### 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.

#### **General review of flora and vegetation of the project corridor**

The project area is located in the geo-botanical district of Kvemo (Lower) Kartli lowland. The cover has been severely modified by economic activities of man. Territories with natural vegetation are scarce in the district (one of the least within the regions of Eastern Georgia). It is especially true for plains, where natural vegetation had been substituted with landraces a long time ago.

Vegetation cover developed within the district, despite significantly limited distribution, is very diverse and complex in terms of types of individual plants and genesis of formations as well as the development history.

Forest vegetation is diverse in phyto-cenological terms. Mono-dominant forests of Georgian oak (*Quercus iberica*) and high mountain oak (*Quercus macranthera*) are developed on the highest part of the area. It is noteworthy that high mountain oak descends fairly low in the mentioned region. Oak-hornbeam (*Carpinus caucasica*, *Quercus iberica*) and poli-dominant leaved forest stands (Georgian and high mountain oak, European ash - *Fraxinus excelsior*, hornbeam - *Carpinus caucasica*, lime - *Tilia caucasica*, field maple - *Acer campestre*, etc.) are distributed in the area as well.

At some area of the district (mainly r. Khrami and Algeti basins) relict forest species have been preserved – remnants of arid open woodland: pistachio (*Pistacia mutica*) and Caucasian hackberry (*Celtis caucasica*). Many species typical for arid open woodland occur within the above: Georgian maple, Balkan maple (*Acer hyrcanum*), fig tree (*Ficus carica*), buckthorn (*Rhamnus pallasii*), Christ's thorn (*Paliurus spina-christi*), spirea (*Spiraea hypericifolia*), smoke tree (*Cotinus coggygria*), elm leaved sumac (*Rhus coriaria*), Ionicera (*Lonicera iberica*), jasmine (*Jasminum fruticans*), etc. This relict forest vegetation, which had also been present in the driest south-eastern part of Eastern Georgia, formed large communities in Kvemo Kartli lowland too. These communities had been later destroyed due to irrational exploitation of men (chaotic logging, periodical grazing in the forest).

Floodplain forests have been also destroyed. They have been preserved in the form of remnants only (mainly in r. Iori floodplain). The following should be noted in the composition: willow (*Salix excelsa*, *S. alba*, *S. pseudomedii*) and asp-willow (*Populus canescens*, *P. nigra*, *Salix excelsa*) stands. Elm (*Ulmus foliacea*), nut tree (*Juglans regia*), mulberry (*Morus alba*), floodplain oak (*Quercus longipes*) are mixed in small amounts. The following are most typical from shrubbery: salt cedar (*Tamarix ramosissima*), blackberry (*Rubus sanguineus*), blackthorn

(*Prunus spinosa*), hawthorn (*Crataegus pseudoheterophylla*), Black Sea dogwood (*Thelycrania australis*), silk vine (*Periploca graeca*), old man's beard (*Clematis vitalba*), sea buckthorn (*Hippophae rhamnoides*), etc.

Xerophilous and hemi-xerophilous shrubbery is widespread within the district, namely, slopes of hills and plateaus - Christ's thorn (*Paliurus spina-christi*), oriental hornbeam (*Carpinus orientalis*), spirea (*Spiraea hypericifolia*), poli-dominant forb shrubbery. According to genesis, the mentioned shrubbery is secondary and developed in the former forest areas (oak, arid open woodland). Tragacanth communities are frequent on severely eroded dry slopes – milkvetch (*Astragalus microcephalus*) and prickly thrift (*Acantholimon lepturoides*).

Steppe grass formations are developed on plains and elevated areas (plateaus, hills). Beard grass (*Botriochloa ischaemum*) steppe is the most widespread. According to the origin, the beard grass steppe of the area is secondary and it has developed on the former forest areas (arid open woodland, floodplain forests, plain and mountain oak forests). Beard grass steppe is diverse in phyto-cenological terms. In some areas beard grass is combined with wormwood (*Artemisia fragrans*) and bi-dominant beard-grass – wormwood community is formed. Beard grass-glasswort (*Botriochloa ischaemum*, *Salsola nodulosa*) is relatively rare. Christ's thorn-beard grass (*Paliurus spina-christi*, *Botriochloa ischaemum*) complexes are common on elevated areas, while needle grass steppe (*Stipa pulcherrima*, *St. Lessingiana*) occurs in the form of smaller plots on hill slopes and in fragments. Poli-dominant grain-forb grass are present on larger areas (*Achillea micrantha*, *Agropyron repens*, *Bromus japonicas*, *Cynodon dactylon*, *Festuca sulcata*, *Filagoarvensis*, *Phleum phleoides*, *Ph. Paniculatum*, *Salvia sclarea*, *Xeranthemum squarosum*, etc).

Semi-desert vegetation occurs within the district (Marneuli and Gardabani plains). It is mainly developed on lowlands and depressions, chestnut and salinized soils. The semi-desert vegetation is mainly represented by wormwood (*Artemisia fragrans*) communities. Glasswort (*Salsola nodulosa*) communities and other semi-desert formations are relatively rarer. Edifier wormwood is entirely dominant in wormwood cenosis. The following other vegetation (characteristic species) is observed - *Caragana grandiflora*, *Scorzonera lanata*, *Sterigmotemum torulosm*, *Torularia torulosa*, etc. Ephemeras and ephemerids are abundant in cenoses in spring - *Alisum tortuosum*, *Brachypodium distachyon*, *Gagea commutata*, *G. dubia*, *Medicago minima*, *Pterotheca marschalliana*, etc. Wormwood semi-desert is the winter pasture of the best quality (mainly for sheep).

Wetland communities grow in marshes and wetlands. These communities are formed by cattail (*Typha latifolia*, *T. laxmannii*).

### **The detailed characterization of the flora and vegetation of the project corridor**

It is noteworthy that detailed botanical research has been conducted within the project corridor of Tbilis-Rustavi road. Consequently, negative and residual impacts as a result of the planned project construction and operation have been revealed both in the project territory and flora and vegetation of the adjacent areas. Plant communities and species (Red List, endemic, rare) of various conservation value have been identified within the project impact zone as well as plants of economic value.

The section of KP 10-15 km is bordered with artificial water channel, which is followed by large and small diameter tree and shrubbery for 3 km. Several residential yards, pastures and arable land are located at the area on the edge of the channel. This part of the road is not prominent for high diversity of vegetation cover. Small stands of artificially planted Turkish pine and black pine are observed. Leaved plants are more abundant, of which the following should be noted: nut, European ash, mulberry, false acacia, plane, asp, and ailanthus. In addition to large trees naturally grown plants of smaller size characterized by low viability confirmed by weakly developed canopy and dry branches (apricot, prune, elm, hornbeam) are present. Plants



occurring on dry valleys and open woodland are more abundant at the end of the road section: Russian olive, Christ's thorn, broom, elm; and xerophilous shrubbery and grasses: Christ's thorn, dogrose, greenbrier, cirsium, fescue, wormwood, etc.

In the section between KP 13-15 km of the road meadows adjacent to the road are used for pastures.

In the section between KP 10-15 km plantations of coniferous plants follow along the left side of the road. Mainly Turkish pine, black pine, cedar and cypress are present. Krtsanisi forest-park abuts this section of the road to the north. Century old aspens, floodplain oak and willows grow in the forest-park along with tamarisk, Russian olive, sea-buckthorn, barberries, liana plants. The existing road passes next to the borders of the park. Widening of the road will require acquisition of a narrow land strip (1m width) at the edge of the park and is associated with the need to cut several trees.

Semi-desert surrounds the floodplain forest. Residential areas are observed at several places at KP 12 km of the road section. Nut, mulberry, pine, cedar and cypress trees are planted in front of yards and residential plots along the highway in this area.



**Fig4.15. Territory Adjacent to Krtsanisi Forest-Park with Elm, Cedar, Plane and Other Species**

From KP 13 km the forest becomes thin and steppes are directly abutted by open woodland, where drought resistant plants are present: Russian olive, almond, pine, tamarisk, oak, prune, spirea, blackthorn, Christ's thorn. The vegetation formations forming the forest-park abutting to the road section are not homogeneously dense. At some areas they are thin, while at others they form hardly accessible dense vegetation.

Section of KP 13-15 km is represented by only by thorny and herbaceous vegetation. It is a transitional stripe between thorny steppes and typical floodplain forests. After 15 km, where ground waters are close to the surface, meadow type thorn-cirsium formations are developed with small fragments of different grain plants: meadow fescue, bluegrass, Timothy-grass, etc. Such areas are used for pastures in summer.

Proceeding from all of the above it could be said that significant damage to vegetation cover during road widening works is mainly anticipated within KP 0-13, especially - from the beginning of the road till Marneuli highway branch.

GPS coordinates of plot #7 are N41°36'28.6"/E 044°56'08.6", 348 m a.s.l. At the side of the highway, at the end of the forest-park artificial pine stand is present – *Pinus* sp. (*Pinus nigra*, *Pinus eldarica*). It is a habitat of medium conservation value.



**Picture4.16.. Fragments of Artificial Pine Stand – End of Krtsanisi Forest-Park**

GPS coordinates of plot #8 are N41°35'10.6"/E 044°56'59.5", 363 m a.s.l. It is the territory till t. Rustavi. Pastures occur within the section adjacent to Martkopi turn. It is a habitat of low conservation value.



**Picture 4.17 Pastures**

GPS coordinates of plot #9 are N41°33'46.2"/E 044°57'55.6", 368 m a.s.l. It is the south-western edge of t. Rustavi, where pastures are present. It is a habitat of low conservation value.



Picture 4.18. Pastures

#### 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. The only site possible to think of the area of a certain importance to protect the biodiversity in the region of Tbilisi-Rustavi road construction, is Krtsanisi woodland park. The forest in the park was restored in the 1940-50s. For a long time it was less accessible for the locals, and at the end of the Soviet era, it was used as a recreational area. A present, it has almost adopted the natural structure of the floodplain forest and there is a stable, though not very numerous animal population developed in it. The forest fragmentation and its isolation from the river Mtkvari floodplain will undoubtedly lead to the further degradation of the vegetation cover and fauna. The second variant of laying the road described in the “document”, in particular, from the railway bridge along the river Mtkvari bank (5 km) to Rustavi stone crusher (14 km), runs along the edge of Krtsanisi woodland park isolating it from the river Mtkvari floodplain.

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. Below the only identified area of medium sensitivity is presented:

GPS coordinates of plot #7 are N41°36'28.6"/E 044°56'08.6", 348 m a.s.l. At the side of the highway, at the end of the forest-park artificial pine stand is present – *Pinus* sp. (*Pinus nigra*, *Pinus eldarica*). It is a habitat of medium conservation value.(Pic. 4.16)





### **Species Included in Red List of Georgia and Found in the Project Corridor**

It is noteworthy that Red List of Georgia, which consists of 56 species of plants, is not full. At present the further modification of species in the Red List is being conducted. Namely, identification of grass species by IUCN categories (determination of their state and protection status categories) is in process. Through extrapolation of the mentioned data the number of the species shall increase significantly in the Red List.

**As a result of the detailed field botanical research only two species from the list of species of the Red List of Georgia has been found - *Juglans regia* L. and *Ulmus minor* Mill.** The list and statuses of the species of Georgian Red List, which are observed in the project corridor, are given below:

<i>No</i>	<i>Latin Name</i>	<i>Common Name</i>	<i>Category Reflecting State and Protection Status</i>
<b>Angiosperms</b>			
2	<i>Juglans regia</i> L.	Nut tree	VU
4	<i>Ulmus minor</i>	Field elm	VU

As a result of the preconstruction botanical surveys we presume that **other species of the Red List of Georgia** will not occur in the project corridor.

In addition, it is noteworthy that some rare, endangered and vulnerable species occur within the project area, i.e.: *Elaeagnus angustifolia* (rare plants), *Pinus eldarica* (species, which is becoming extinct). As a result of preconstruction botanical surveys the existing list of rare species shall presumably increase.

## **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 Shyblak inclusions. There are animals here mostly preferring open arid habitats. 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 aspen, 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 with *Botriochloa* and *Stipa* steppes, dry shrubland (*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.

**Table 4.13.** Animal species included in the Red Data List of Georgia (2006)

№	ლათინური დასახელება	ქართული დასახელება	გავრცელების სახელწოდება	სტატუსი	ურბანული	სტეპი	გამოყენება
		<b>ძუძუმწოვრები</b>					
1.	<i>Rhinolophus euryale</i>	სამხრეთული ცხვირნალა	Mediterranean Horseshoe Bat	VU	+		Colonies in buildings, caves, forests
2.	<i>Rhinolophus mehelyi</i>	მეჰელის ცხვირნალა	Mehely's Horseshoe Bat	VU	+	+	Colonies in buildings, caves, steppe
3.	<i>Cricetulus migratorius</i>	ნაცრისფერი ზაზუნელა	Grey Dwarf Hamster	VU		+	In stone
4.	<i>Mesocricetus brandti</i>	ამიერკავკასიური ზაზუნა	Brandt's Hamster	VU		+	In the fields, pastures
5.	<i>Meriones tristrami</i>	მცირე ზაზუნა	Tristram's Jird	VU		+	In the fields, pastures
		<b>ფრინველები</b>					
6.	<i>Buteo rufinus</i>	ველისკაკაჩა	Long-legged Buzzard	VU		+	Possible
7.	<i>Aquila heliaca</i>	ბეჟობის არწივი	Imperial Eagle	VU		+	Nutrient

8.	<i>Aquila chrysaetos</i>	მთისარწივი	Golden Eagle	VU		+	Nutrient
9.	<i>Neophron percnopterus</i>	ფასკუნჯი	Egyptian Vulture	VU		+	Nutrient
10.	<i>Aegypius monachus</i>	სვავი	Cinereous Vulture	EN		+	Nutrient
11.	<i>Gyps fulvus</i>	ორბი	Eurasian Griffon	VU		+	Nutrient
12.	<i>Falco cherrug</i>	გავაზი	Saker	CR		+	In the 1
13.	<i>Falco biarmicus</i>	წითელთავაშავარდენი	Lanner Falcon	VU		+	In the 1
14.	<i>Aegolius funereus</i>	ჭოტი	Boreal Owl	VU			Possible
15.	<i>Grus grus</i>	რუხიწერო	Common Crane	EN		+	In the 1
16.	<i>Panurus biarmicus</i>	ულვაშაწივიწივა	Bearded Ti	VU			Possible
		<b>ქვეწარმავლები</b>					
17.	<i>Testudo graeca</i>	ხმელთაშუაზღვრისკუ	Mediterranean Tortoise	VU		+	Habitat
18.	<i>Ophisops elegans</i>	კობტაგველთავა	Snake-Eyed Lizard	VU		+	Dwells in Kumisi
19.	<i>Eryx jaculus</i>	დასავლური მახრჩობელა	Western Sand Boa	U		+	Habitat
20.	<i>Eirenis collaris</i>	საყელი იანიერი ნისი	Collared Dwarf Snake	VU		+	Habitat
		<b>ამფიბიები</b>					
21.	<i>Pelobates syriacus</i>	სირიული მყვარი	Syrian Spadefoot Toad	EN		+	In standing water
		<b>ძვლავანი თევზები</b>					
22.	<i>Sabanejewia aurata</i>	წინააზიური გველანა	Goldside loach	VU			In the 1 branch tributary
		<b>მწერები</b>					
23.	<i>Manduca atropos</i>	სფინქსი მკვდართავა	Death's Head Sphinx	EN			Habitat
24.	<i>Bombus fragrans</i>	ველის დიდ ბაზი	Violet Carpenter bee	VU		+	Habitat
25.	<i>Xylocopa violacea</i>	იისფერი ქსილოკოპა	Violet Carpenter bee	VU		+	Habitat
26.	<i>Onychogomphus assimilis</i>	მსგავსი ნემსი ყლაპია	Dark Pincertail	VU		+	Propagates in water

One species of fish included in the National Red Data List dwells in the river Mtkvari and its tributaries - Goldside loach (*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 may be demolished in case variant 2 is realized. Under the project, a great proportion of old buildings are to be demolished. Several large hollow trees are growing in the settled areas and zone of laying the road along the existing road, and they are to be liquidated. 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 2). 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.**Chiroptera species likely to dwell in the road construction corridor

#	Latin name	Common name	Georgian name	Shelters
1.	<i>Rhinolophus ferrumequinum</i>	Greater Horseshoe Bat	დიდიცხვირნალა	Buildings, caves
2.	<i>Rhinolophus hipposideros</i>	Lesser Horseshoe Bat	მცირეცხვირნალა	Buildings, caves
3.	<i>Rhinolophus euryale</i>	Mediterranean Horseshoe Bat	სამხრეთულიცხვირნალა	Buildings, caves
4.	<i>Rhinolophus mehelyi</i>	Mehely's Horseshoe Bat	მეჰელისცხვირნალა	Buildings, caves
5.	<i>Eptesicus serotinus</i>	Serotine	მეგვიანელამურა	Trees
6.	<i>Myotis blythii</i>	Lesser mouse-eared bat	ყურწვეტამღამიობი	Buildings, caves
7.	<i>Myotis mystacinus</i>	Whiskered Myotis	ულვაშამღამიობი	Buildings
8.	<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	ჯუჯალამორი	Buildings
9.	<i>Pipistrellus pygmaeus</i>	Soprano Pipistrelle	პაწიალამორი	Buildings
10.	<i>Pipistrellus kuhlii</i>	Kuhl's Pipistrelle	ხმელთაშუაზღვისლამორი	Buildings
11.	<i>Nyctalus noctula</i>	Noctule	მელამურა	Trees
12.	<i>Nyctalus leisleri</i>	Lesser Noctule	გიგანტურიმელამურა	Trees
13.	<i>Plecotus auritus</i>	Brown Long-eared Bat	რუხიყურა	Buildings

The only group of animals under the danger of a significant harm during the road building and operation, is chiroptera. 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 widening the existing Tbilisi-Rustavi road and construction of new sites.

All chiroptera 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	<i>Lepus europaeus</i>	European Brown Hare	კურდღელი
2	<i>Myocastor coypus</i>	Coypu	ნუტრია

3	<i>Canis lupus</i>	GreyWolf	მგელი
4	<i>Canis aureus</i>	Jackal	ტურა
5	<i>Vulpes vulpes</i>	RedFox	მელა
6	<i>Meles meles</i>	EurasianBadger	მაჩვი
7	<i>Martes martes</i>	EuropeanPine Marten	ტყისკვერნა
8	<i>Felis silvestris</i>	Wild Cat	ტყისკატა

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 Biotops 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. Besides, three bat species (See Table 2) form colonies in tree hollows. The premises are to be demolished and old trees are to be cut down in the process of widening the existing Tbilisi-Rustavi road and construction of new sites.

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 with *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. As for other species, they are under a tense pressure of preying

The area of Tristram's Jird (*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-Eyed Lizard (*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 (variant 3).

A Syrian Spadefoot Toad (*Pelobates syriacus*) propagates in the watercourses along the route of variant 3.

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 Grey Dwarf 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*), Western Sand Boa (*Eryx jaculus*) and Snake-Eyed Lizard (*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's Jird (*Meriones tristrami*), the species included in the Red Data List of Georgia.



## 5. Socio-Economic Conditions

### 5.1. Demography

#### Tbilisi

123. Tbilisi population reached maximum in 1992 – 1.276 million people. In the following years, when political turmoil occurred, the city population has decreased by almost 15 %.

The population number more or less stabilized in 2004-2005 and reached 1.08 million. From 2005 unequal growth has occurred (Table 5.1). During the recent decade the low population growth rate has been caused by two major factors: low natality rate, which equals death rate and migration.

**Table 5.1 Number of live births, deaths and natural growth of population in Tbilisi (2000-2010)<sup>4</sup>**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Population (thousands)	1,097.5	1,088.5	1,081.7	1,079.1	1,078.2	1,079.7	1,103.3	1,101.1	1,136.6	1,136.6	1,152.5
Number of live births	15,380	15,648	16,057	16,058	16,059	16,060	16,061	16,062	16,063	16,064	-
Number of Deaths	11,690	11,408	11,465	12,597	12,424	11,164	12,454	12,040	12,123	12,397	-
Natural Growth	3,690	4,240	4,592	3,461	3,635	4,896	3,607	4,022	3,940	3,667	-
Population growth rate in Tbilisi	-0.9%	-0.8%	-0.6%	-0.2%	-0.1%	0.1%	2.2%	-0.2%	3.2%	0.0%	1.4%

Tbilisi population has always been multi-ethnic. Many ethnic groups lived in the city along with Georgians – Armenians, Azeri, Russians, Ukrainians, Jews, Greeks, etc. In XIX Georgians were actually the minority in the capital. Table 5.2 shows ethnic groups of Tbilisi in 1876-2002.

**Table 5.2 Ethnic Groups Living in Tbilisi**

	1876	1897	1922	1926	1959	1979	1989	2002
Total population (thousands)	104.0	159.6	233.9	294.0	694.7	1056.1	1246.9	1081.7
Georgians	22.2	42.2	80.9	112.2	336.3	656.4	824.4	910.7
Armenians	37.6	47.1	85.3	100.1	149.2	152.9	150.1	82.6
Russians	30.0	44.8	38.6	45.9	125.7	129.1	124.9	32.6
Ossetians		0.9	1.4	2.8	15.6	27.9	33.2	10.3
Ukrainians		2.7			10.9	12.6	16.1	3.3
Jews	13	2.9	8.8	8.9	17.3	14.8	13.5	1.6
Azeris			3.3	5.8	9.6	12.9	18.0	10.9
Kurds				2.5	12.9	23.4	30.3	2.1
Greeks	0.4	1.2	1.3	1.4	7.1	16.2	21.7	3.8
Other ethnic Groups	11.6	17.8	14.3	14.1	10.1	9.7	14.7	23.8

#### Rustavi

<sup>4</sup>Source: National Statistical Office of Georgia, The number of people as of 1 January is provided for each year

124. Small increase of Rustavi population has occurred during the last five years. Table 5.3 shows the dynamics of Rustavi population growth according to 1 January, 2011 situation.

**Table 5.3 Dynamics of Rustavi Population 2007-2011**

Years	2007	2008	2009	2010	2011
Population (thousand people)	117.9	117.3	117.4	119.5	120.8

**Table 5.4 Natality has increased in Rustavi in the recent years**

Years	2006	2007	2008	2009	2010
Number of born	1238	1246	1619	1666	1824
Number of deceased	1144	1136	1151	1261	1095
Increase	94	110	308	405	729

The majority of Rustavi population is Georgian – 88 % of the population. Table 5.5 shows the distribution of the town population according to nationalities.

**Table 5.5 Distribution of population by nationalities**

Ethnic group	Number	Percentage
Georgian	102 151	88
Azeri	4993	4
Armenian	2809	2
Ossetian	1410	1
Russian	3536	3
Abkhazian	44	<1
Greek	257	<1
Ukrainian	395	<1
Iezid	293	<1
Other	4885	4

### **Gardabani**

125. Gardabani municipality consists of 42 residential settlements, 1 town, 2 large villages and 39 villages. Large villages are: Gamarjveba – 53 thousand residents, Martkopi – 7.7 thousand residents, Sartitchala – 7.0 thousand residents. The total population is 114 thousand people. These are mainly ethnical Georgians – 54.2 % and Azeri – 43.6 %. Small group of Armenians is also present – 0.7 % as well as Russians – 0.7 % and Ossetians – 0.4 %<sup>5</sup>.

Population density within the municipality is 100-125 residents per square km. Such industrial centers as Tbilisi and Rustavi are the main means of employment of the population. However, due to the fact that major part of the industrial enterprises has either stopped functioning or cancelled, the significant field of population employment is agriculture.

The main fields of agriculture are: vegetable growing, milk produce, fruit and flower growing.

## **5.2 SOCIO-ECONOMIC CHARACTERISTICS**

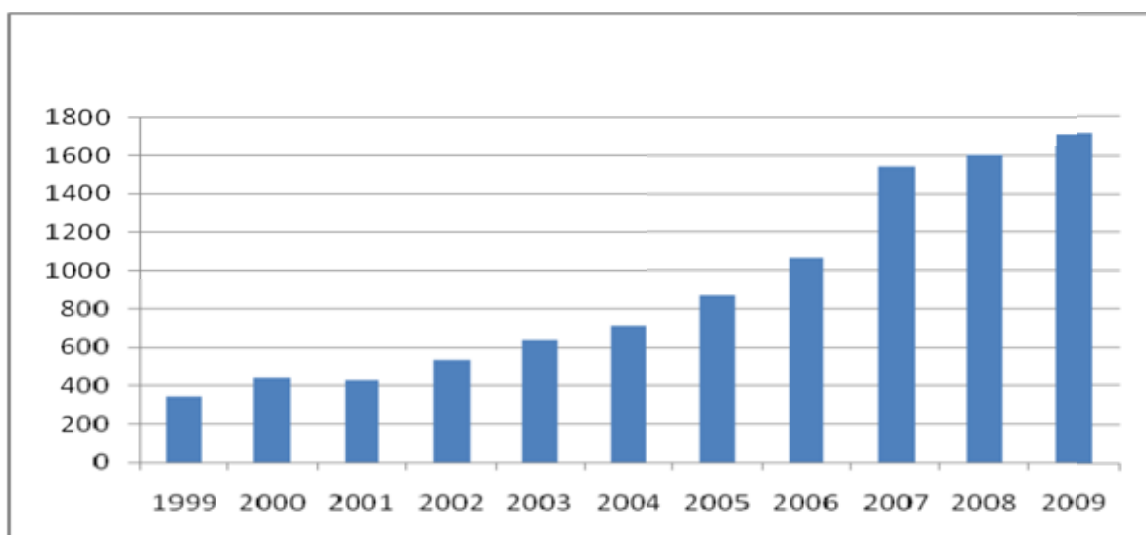
<sup>5</sup>Statistics according to 2002 data

## Industry

### Tbilisi

126. Recovery of economic, including industrial, activities started in second half of 1990-ies and continued through the first decade of the new millennium Table 5.6. Despite the revitalization, industrial production in Tbilisi still remains very low compared to its levels in Soviet time. Many of large scale enterprises in the sectors of heavy machinery, electric machines and microelectronics, textile and others either do not function or manufacture goods in very limited amounts. Currently, relatively well developed industrial sectors are wine production, production of other alcoholic and nonalcoholic beverages, food processing (meat and dairy products, fruits and vegetables), production of construction materials (cement, asphalt).

**Table 5.6 Production in industrial sector in Tbilisi (in current prices, mln GEL)<sup>6</sup>**



Along with the growth of industrial production in Tbilisi, the share of the capital city in the countries total industrial production is also increasing. At present about 45% of Georgia's industrial products, in monetary terms, is produced in Tbilisi.

### Rustavi

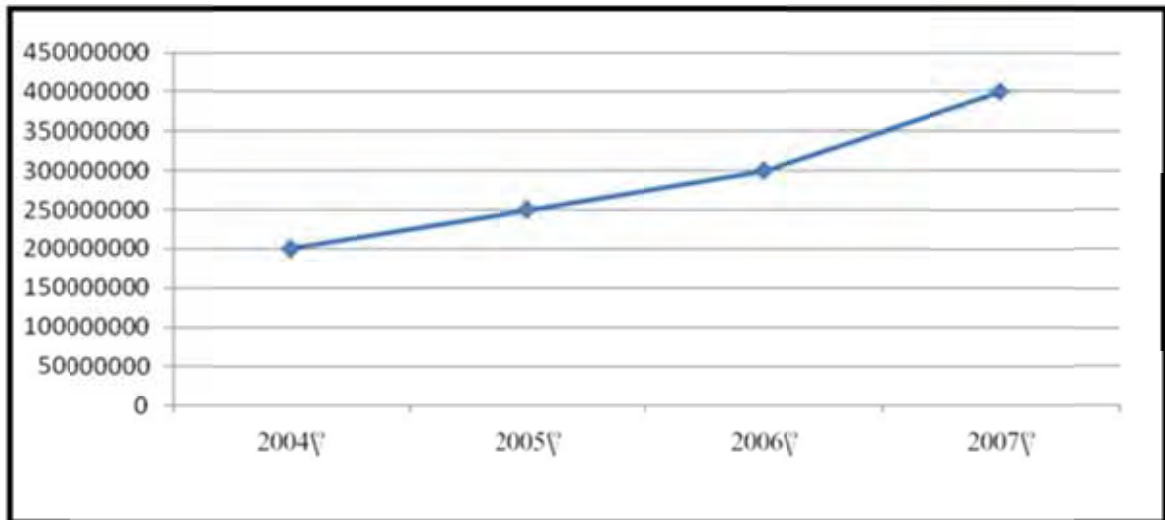
127. There are 26 large enterprises on the territory of Rustavi, from which the largest manufacturing companies are: JSC "Karat Plus" (former "Energy Invest"), JSC "Rustavi Metallurgical Plant", JSC "Heidelberg Georgia", JSC "Jeosteel", JSC "Kazbegi" and etc. The growth of the cost of production and service of different branches and spheres in 2004-2007 made 98, 3% (Table 5.7).

**Table 5.7 Dynamics of growth of service and produced goods in 2004-2009<sup>7</sup>**

<sup>6</sup>Source: National Statistical Office of Georgia. <http://www.geostat.ge/>

<sup>7</sup>Source: Department of statistics





According to 2007 data, manufacturing industry plays the leading role in Rustavi economics. It's share makes 89.9 % ; building industry makes – 2.7 % and the share of the rest branches and spheres is very little.

### **Gardabani**

128. Electro energetics is noteworthy from industrial fields, as Gardabani thermal power station is located here, which is the largest in Trans-Caucasus and started functioning in 1963. 5 hydro power stations on the upper highway of Kura and Samgori are also important. The power produced by the stations is distributed in Tbilisi and Rustavi, as well as entire Georgia and other districts of Trans-Caucasus. Industrial enterprises of construction material, light and food production are located in Gardabani. Gardabani carton-ruberoid plant is one of the large enterprises of the district. Fruit, grape and vegetable processing plants should be noted from food industry..

### **Agriculture**

#### **Tbilisi**

129. Agriculture was well developed in suburbs of Tbilisi until 1990-ies. Main agricultural products produced here included fruits, vegetables, meat and dairy products. The products were sold mostly to Tbilisi markets.<sup>44</sup> Agricultural production has been decreased dramatically over the last two decades. According to statistical information provided by the National Statistical Office of Georgia value added of agriculture in Tbilisi reduced amounted 1 mln GEL by 2009 (Table 5.8) It is unclear whether this statistical data include agriculture in the villages that joined the city in 2006. In general, there is very little information available on agricultural activities in the city or around it. Moreover, there is further more limited information on environmental pressures related to this sector.

**Table 5.8 Agriculture Prices between 2006 and 2008 (in mln GEL)**

	2006	2007	2008
Agriculture (current prices, mln GEL)	1.4	1.0	1.0

### **Rustavi**

130. There is scarce data on the agricultural activities in Rustavi and its surroundings. The total area of the city is 6060 ha. The total area transferred to physical and legal persons amounts to 435.68 ha, including 165.68 ha of non-agricultural lands and 270.00 ha of agricultural lands.

### **Gardabani**

131. The total area of the district is 160900 ha, including 66899 ha of agricultural lands, 37035 ha of arable lands, 2193 ha of hayfields, 22183 ha of grasslands and 17079 ha of nonproductive land.

The dominant crops in the district are wheat and maize and the following annuals: tomatoes, eggplants, cabbages, onions, cucumbers, bell peppers, potatoes, carrots, grapes, wheat, water melons, melons, barley. etc.

An average of 70022 tons of agricultural products produced in the district are delivered to the local market annually, including 6900 tons of wheat, 1210 tons of barley, 35 tons of oats, 11500 tons of maize, 10 tons of beans, 967 tons of sunflowers, 45 tons of potatoes, 46780 tons of vegetables, 176 tons of pears, 98 tons of quinces, 224 tons of plums, 121 tons of cherries and sweet cherries, 121 tons of apricots, 56 tons of grapes, 1670 tons of grapes.

The agricultural production was a priority sector for Gardabani District. At present vegetable and grain production and poultry breeding remain the priorities of the region.

### **Employment and Unemployment Levels**

#### **Tbilisi**

Unemployment level in Tbilisi is very high. During nearest last year's it's had achieved 29-30%.

**Table 5.9 Employment and Unemployment Levels**

Status	2005 y.	2006 y.	2007 y.	2008 y.
Active Population (labors)	429.8	434.7	480.7	430.1
Employed	305.0	303.6	346.1	302.1
Haired	248.9	248.8	291.0	240.6
Self employed	55.6	53.8	55.2	61.4
vague	0.5	1.0	0.0	0.1
Unemployed	124.8	131.1	134.6	128.0
Unemployment level (%)	29.0	30.2	28.0	29.8
Active level (%)	54.4	52.9	55.3	52.4
Employment level (%)	38.6	37.0	39.8	36.8

Despite the State Strategy on Gender Equality elaborated by the group of representatives of the Gender Advisory Council under the Chair of Parliament and the Governmental Commission working on gender equality issues in Georgia (including representatives of government and non-government sectors), the number of employed men in Tbilisi is higher than that of women (see Table 5.11).

**Table 5.10 Unemployment and Gender issues (2000-2008 years) m-men; W-women**

Status	2000y	2001y.	2002 y.	2003 y.	2004 y.	2005 y	2006 y.	2007 y.	2008 y.
Unemployment level (%)	w.- 9.7 m11. 0	w.- 10.7 m- 11.6	w.- 11.0 m- 14.0	w.- 11.5 m- 11.5	w.- 11.8 m- 13.4	w.12 .6 m- 16.8	w.- 11.7 m- 15.2	w.- 12.6 m- 13.9	w.- 16.8 m- 16.1
Active level (%)	w- 57.2 m- 75.1	w-58.3 m- 75.9	w- 56.6 m- 75.8	w- 57.7 m- 76.3	w- 56.9 m- 74.3	w- 55.9 m- 73.5	w- 53.6 m- 72.2	w- 55.6 m- 73.3	w- 53.5 m- 73.4
Employment level (%)	w- 51.6 m- 66.0	w-52.0 m- 67.1	w- 49.9 m- 65.1	w- 51.0 m- 67.5	w- 50.2 m- 64.3	w- 48.8 m- 61.2	w- 47.4 m- 61.2	w- 48.1 m- 63.1	w- 44.9 m- 61.1

During nearest last 15 years employed pupil's wages are increased.

**Table 5.11 Average wages. 1995-2008 year. (between employers)**

Year	Amount	Currency
1995y	13.5	lari
1996y	29.0	lari
1997y	42.5	lari
1998y	55.4	lari
1999y	67.5	lari
2000y	72.6	lari
2001y	94.6	lari
2002y	113.5	lari
2003y	125.9	lari
2004y	156.6	lari
2005y	204.2	lari
2006y	277.9	lari
2007y	368.1	lari
2008y	534.9	lari
2008w	534.9	lari

### **Rustavi**

132. According to 2008 data of department of statistics, 14 113 people were employed in Rustavi enterprises, among them 41,7% was woman and 58,3%- men. The total amount of employed people is divided according the following: large enterprises – 68,5%; middle-sized enterprises -14,2 %; small enterprises – 58,7%. According to kinds of economical activity, in the total number of employed people the most shares is on employees in manufacturing industry.

### **Gardabani**

The population density varies between 100 and 125 inhabitants per square meter. The industrial centers like Tbilisi and Rustavi are the main means of employment provision. However, as many of the industrial enterprises stand idle or ceased their operations, agriculture provides a large share of employment. The main sub-sectors of agriculture are vegetable growing, dairy farming, fruit and flower growing.

## **Infrastructure and Development**

### **Tbilisi**



133. Sewage and drainage systems are covered 100% in the city. At the same time current infrastructure is very old and unsure. As for the existing situation in the water supply of Tbilisi, 70% of the city is supplied with no interruption, while 30% is supplied with water according to a set schedule. The city's water supply meets the national standards laid out in the law of Georgia "on potable water". In terms of ensuring the quality of the water supply, it should be noted that in the city's water supply company, Tbilitsqalkanali Ltd, which has a monopoly in the sector, 3 chemical-bacteriological laboratories and 1 chemical laboratory are in operation. These labs are 100% responsible for the quality of the city's water supply.

Throughout 2005- 2006 extremely important reconstruction and rehabilitation works have been carried out on the Tbilisi water supply network. The majority of central water pipelines have been replaced, which has significantly decreased the number of emergency shut-downs of the system and, accordingly, losses of water. A total of 59 km of the network in various districts of Tbilisi was replaced.

Municipal waste management has greatly improved recently. Private companies which service different districts of Tbilisi on the basis of tender results, acquired the respective equipment. Waste collection issue has drastically improved, two old landfills were closed and a new landfill in compliance with EU requirements was opened. Several companies obtained licenses for the treatment of hazardous waste of various types. It should be noted that hazardous waste management both in Tbilisi and entire Georgia remains one of the acute problems.

### **Rustavi**

134. Rustavi public utilities have greatly improved recently. Limited power and gas supply, which had been an unsolved problem in Rustavi of the 90s, have been eliminated. Rustavi water supply is facilitated by "Rustavi Water". The mentioned company along with "Georgian Water and power" and "Mtskheta Water" is the member of the same investment group, which provides water supply and water related services to 51 621 subscribers in t. Rustavi. The majority of the rehabilitation works in the town has already been completed and the population is facilitated with water in almost uninterrupted regime. Waste water is directly discharged in r. Kura without any treatment.

Rustavi is supplied with gas by JSC "Rustavgas", which was established in 1996. In 2006 "Rustavgas" started individual meter installation and movement of the gas meters in entrances first time in Georgia. At present the town is entirely gasified. The cost of the used gas is 1m<sup>3</sup> – 502 GEL and 790 GEL for legal entities.

Some improvements occurred in the solid municipal waste management. Company which serviced Rustavi purchased modern waste trucks and both metal and plastic containers. In 2011 a new landfill in compliance with EU standards was opened in Rustavi through EBRD and Sida funding. Hazardous waste management in Rustavi and entire Georgia is still a problem.

### **Gardabani**

135. Gardabani water supply is facilitated by "Rustavi Water". The mentioned company along with "Georgian Water and power" and "Mtskheta Water" is the member of the same investment group, which provides water supply and water related services to 3984 subscribers in t. Gardabani. The company provides for both water supply and water related services. The waste water flows into Gardabani water treatment plant and after mechanical treatment is discharged in r. Kura. T. Gardabani is gasified and facilitated with natural gas.

Municipal waste management is undertaken by a private company, which has respective infrastructure, while waste disposal is conducted on Rustavi landfill.

## **Transport**

### **Tbilisi**

136. Transport servicing of the population is one of the most significant indicators of urban life. Tbilisi has always characterized with the diversity of the transport system. Tbilisi metro has

offered services to many passengers since its opening. According to 2009-2011 data, the number of passengers was about 206 000 daily. Since 1<sup>st</sup> October, 2010 the travel cost in Tbilisi metro can only be paid via digital travel card.

Autobus along with metro has remained one of the main municipal transports. 476 movable units of M3<sup>8</sup> category of autobuses moves in the capital daily. The number of large load autobuses is 110 and medium load autobuses – 366 units. M2<sup>9</sup> category autobuses have 2128 movable units.

Taxi - in Tbilisi as well as in any other city, taxi is the fastest above ground transport. Taxi is the only public transport in the capital which can be used 24 hours a day. Railway – the first train from Tbilisi to Poti arrived on 10<sup>th</sup> October, 1872<sup>10</sup>. At present there five railway stations in Tbilisi: Avtchala, Didube, Navtlughi and Tbilisi Central Station. The railway of the capital is linked with all regions of Georgia and Armenia, Azerbaijan and Russia. Railway will connect Georgia with Turkey in the nearest future.

## **Rustavi**

137. The kinds of transport moving on intercity routs are: municipal transport (buses), private minibuses and taxis. Road signs and traffic lights are provided to regulate traffic. First in Georgia electronic boards, which reflect the schedule of bus movement were installed in Rustavi. The travelling fee by bus is 20 Tetris. The travelling by minibuses in the city is 50 Tetris. The fees of Rustavi-Tbilisi minibuses range from 1.30 to 1.50 GEL in accordance with the route you take. Travelling by taxi costs 1 km – 60 Tetris.

LTD “Rustavi Municipal Autotransportation Company” is in charge of municipal transport. It owns 33 buses, among them: makes “Bogdan”, “i-van”, 18 units, “Dafi” make- 8, and so called “Pazik” – 1 unit.

## **Gardabani**

138. Transport infrastructure of Gardabani district is well developed. Broad network of both automobile and railway highways is present here. The types of transport on internal town routes are: municipal transport (autobus), private route micro-buses and taxi. Gardabani is connected to Tbilisi and Rustavi through private route micro-autobuses.

## **Healthcare**

### **Tbilisi**

139. Polyclinics, dispensaries, health centers, women consultation clinics, doctor ambulatories and

hospitals (inpatient healthcare) make up the core of the primary healthcare in Tbilisi.

Table 5.12 provides data of the healthcare system in Tbilisi.

**Table 5.12 Health Care Facilities in Tbilisi**

Number of hospitals 78	Number of hospital beds 4078
Independent woman consultations, clinics and dispensaries 117	Number of physicians (excluding dentists) 10098
Number of paramedical personnel 7079	
Number of hospitals 78	Number of hospital beds 4078
Independent woman consultations, clinics and dispensaries 117	Number of physicians (excluding dentists) 10098

At present, nearly all health care providers are private actors, independent of the state except the centres of tuberculosis, infectious disease and mental hospital. There are also various state programs in healthcare system for specified diseases covered from the public funds. Much

<sup>8</sup> Large and medium load autobuses

<sup>9</sup> Route taxis

<sup>10</sup> The Academy of Sciences of Georgian SSR, economic-geographic research of Vakhushti Bagrationi Institute of Geography, Tbilisi Press, Soviet Georgia, 1989

hospital stock has been sold to the private investors for redevelopment and modernization. Mandatory social health insurance, introduced in 1995, which proved to be ineffective, was abandoned in 2007<sup>11</sup>. Private health insurance is being promoted by the current government as the main mechanism for the pre-payment of health services in Georgia. Private insurance coverage for households living below poverty line and teachers of the public schools of Tbilisi is paid from the public funds but all other individuals are expected to purchase insurance coverage on their own initiative. There are a number of private companies in the country offering medical insurance coverage, however as unemployment is high and average households income is low, many people cannot afford paying insurance premiums<sup>30</sup>. Out-of-pocket payments remain the main source of funding for the health system in Georgia. This situation reduces access to appropriate medical services for much of the population.

### **Rustavi**

140. In Rustavi operates three inpatient hospital, five outpatient clinics, and maternity homes. From July, in the New – Psycho-neurological clinic, which patients with mental problems as well as ambulatory and hospital services were provided. Also in town is the Blood Transfusion Centre, and anti-tuberculosis health centers. It also operates a national skringing – Center, which was created to prevent breast cancer and women age 40 and over is free mammology research. In addition, there are a number of diagnostic centers, medical, dental clinics and private offices.

### **Gardabani**

141. The following function within Gardabani municipality: new Samgori doctors' ambulatory, children's polyclinic, Gardabani district infectious hospital, Gardabani maternity hospital, Davit Gugunashvili dental cabinet and therapeutic cabinet. Doctors' ambulatories also function in the following large villages and villages: Kesalo, Sarthitchala, Norio, Nazarlo, Martkopi and Kumisi.

Local self-government of Rustavi with Regional hospital of Gardabani, Tbilisi City Hospital # 5, mediation services and other health facilities supported by a number of medical action, to which free health examinations and various kinds of expensive medicines and other commodities have been granted. Demonstrations have already been used internally moved individuals, families' mothers, vulnerable families.

## **Education**

### **Tbilisi**

142. The legislative base of the education has greatly improved in Georgia recently, priority directions have been identified and public involvement increased in the educational process. According to 2006 situation 15 elementary professional educational institutions have been recorded in Tbilisi, of which 2 are self financed. State funds 8 secondary professional educational institutions. The involvement of the local authorities into the social dialogue is very important for the effective use of the mentioned potential. The dialogue should aim at establishment of the workforce with quality professional skills on the labor market of the capital. Moreover, respective structures of the local authorities should coordinate the mentioned process.

**Table 5.13 Higher Education Institutions Functioning in Tbilisi in 2002-2006<sup>12</sup>**

Sector	2002/2003	2003/2004	2004/2005	2005/2006
Number of higher education	105	102	116	106

<sup>11</sup>National Healthcare System Analysis Report 2001-2007, Ministry of Health. 2009.

<http://www.moh.gov.ge/>

<sup>12</sup>Source: Department of Statistics of the Ministry of the Economic Development of Georgia

institutions				
State sector	15	15	15	13
Non-state sector	90	87	101	93

### **Rustavi**

143. 26 public schools, 20 private schools, 1 higher educational institution, 3 state profession re-qualification centers and up to 10 private colleges function in Rustavi at present. The number of pupils was 19 984 for the beginning of the 2010/2011 study year (according to data of 5<sup>th</sup> April, 2011).

As regards pre-school institutions, the legal status of Rustavi kindergartens changed in 2008 and non-commercial legal entity "Association of Kindergartens" was established. It is financed from the local budget.

### **Gardabani**

53 public schools, 2 secondary professional institutions and 1 higher educational institution function within Gardabani municipality.

## **5.3 Expected social impact of the Project**

### **5.3.1. General social impact of the Project**

144. 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.

The Project is particularly important for the population of the city of Rustavi, whose great part works or studies in Tbilisi. The possibility of safe, rapid and comfortable travel will be an important positive social result for this social group. Improved roads ensure better integration of the local population in the social-economic system and better access to the markets, supplies and services. This includes better prospects of receiving timely medical aid.

### **5.3.2. Construction-related social impacts**

145. 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**

146. The detailed Resettlement Action Plan is under preparation and the first draft LARP will be submitted to ADB in 1 week. The census surveys, detailed measurements, sociological assessment and other field works are completed .

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 legalizable 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).

Severely affected households have been identified. In this case, the land loss is not criteria for severity of impacts as nobody is losing agricultural land used for agricultural needs and thus the lost land parcels cannot be considered as income generating asset. Nobody is losing also residential land and houses. Severity of impact could be estimated only based on income loss. It should be noted, that for large companies, like Lukoil, possessing expended networks of petrol stations over the whole Georgia, the loss of 1 petrol station is not severe impact. Severity of impacts on other businesses is currently specified. Besides that, all of the 31 employees losing their jobs are deemed to be severely affected, as their families lose more than 10% of their income.

Amongst the affected households 2 are headed by the women without support of male member of family capable of working. Both of them are employees losing job. These 2 AHs and 11 refugees from Abkhazia are deemed as vulnerable and will receive allowances equal to 3 months of subsistence minimum. No one of affected AHs are under the poverty line. In total 13 vulnerable AHs are identified for section 3 of the Project.

The Land Acquisition and Resettlement Plan (LARP) will provide detailed census of affected households, inventory of losses, 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.

#### **Principles Adopted for the Project**

148. To reconcile the gaps between Georgia laws/regulations and ADB's SPS (2009), MDFG has drafted this LARP 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**

149. 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**

150. 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, legalizable, 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.

151. 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**

152. 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. Legalizable 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 a 3 months 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 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 sharecropping 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 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

#### Tbilisi

Feudal Georgia and generally entire Trans-Caucasus was covered with great many caravan routes. Through these routes Georgia connected to such distant countries as Arabia, India, Persia, Byzantium, etc. According to foreign and Georgian historical sources, the capital of

Georgia – Tbilisi was a junction of trade caravan routes in the middle ages. The road of the developed centers of the old world and cultural realm also went through the city. Roads from different directions had resulted in many gates of the fortification of Tbilisi – Meidani Kari (Meidani Gate), Ganjis Kari (Ganja Gate), Mtsire Kari (Small Gate), Rabadis Kari (Rabad's Gate), Soghdebilis Kari (Soghdebil's Gate).

The capital of Georgia – Tbilisi is one of the oldest and most picturesque cities in the world located on the crossroads of the east and west. Its history comprising one thousand five hundred years is closely linked with the history of Georgian people. The city has witnessed peaceful life, intensive construction and cultural flourishing as well as countless invasions, ravaging and plundering and lengthy periods of foreign supremacy. Persians, Byzantines, Khazars, Arabs, Mongols, Turk-Selchukians and many more battled for Tbilisi and yet Georgian people have managed to preserve it as a capital of a strong united Georgian state.

As a result of archeological research it has been discovered that all districts of Tbilisi had been populated since fairly early periods (V-IV millennia B.C.) up to and including the late feudal age. Up to 250 archeological monuments of different periods have been discovered in Tbilisi so far. The stratigraphic layers of V-XIX c.c. urban life of Tbilisi have been most clearly revealed as a result of archeological excavations of territory adjacent to the garden close to Erekle II square; 8 m thick cultural layer comprised remnants of household and residential building of that period, water pipeline, ceramic and other craftsmanship remnants, imported and local burnt and unburnt ceramics, precious stone, glass, gold and silver jewelry, local and foreign numismatic material.

Old districts of Tbilisi are located in the southern part of the town near hot sulphur waters. In IV c. a bridge (near Metekhi) was built over the narrowest part of r. Kura, while a citadel (called Kala, Narikala, Deda-Tsikhe (Mother-Fortress) etc. in different times) was constructed on the mountain and its slope of the right bank. The citadel had been the architectural dominant of the city of early and developed feudal ages.

The above determined the structure of the city of the period, which had not significantly changed until XIX c. The initial appearance and planning structure have been preserved almost to these days. Later Tbilisi grew towards and against the river flow outside Tiflis and Kala.

According to foreign and Georgian historical sources, Tbilisi was a typical feudal city – economically strong and facilitated with conveniences in the middle ages. Trade, craftsmanship, markets and squares had been well developed. It was a large center of international trade relationships. Development was diverse as well – royal and aristocrats' palaces, citizens' houses, bathes, inns, caravanserais, and café-shops and of course – first churches, the construction of which, according to the tradition, is assigned to the founder of Tbilisi King Vakhtang Gorgasali (452-502). Tbilisi has been multi-national city since ancient times. People of all nationalities and religions felt well in the city, which is confirmed by cult constructions of all confessions preserved till now.

Similar to the old capital of Kartli – Mtskheta, the majority of the first churches of Tbilisi were built according to the names of the monasteries of the Holy Land of Palestine, according to the legend: Sioni – Virgin Mary's church, Golgotha – St. Cross church, Bethlehem – Virgin Mary's church, later called Petkhain, Tabor – Transfiguration church and Metekhi – Virgin Mary's church, which has connotations with the church built on the tomb of the Virgin in Gethsemane, Jerusalem. The symbolic icon of Aton mountain, yet another holy place, is the prominent dominant of Tbilisi today – Mtatsminda.

The appearance of Tbilisi of the late feudal age has been preserved in sketches by XVII c. European travelers (Turnifor, Chardin) and city plan and description drawn by Prince Vakhushti in 1735.

### **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 been 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 been 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 archeologically 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 the 18 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**

163. 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.

164. 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 (2<sup>nd</sup> 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 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.

As it is seen from the aerial photos (fig. 6.1- Fig. 6.4), along the section 3 existing road passes in a narrow corridor between the patches of Krtsanisi Forest-Park owned by Georgian Orthodox Church (left hand) and dense network of private land plots on the right side (km 10.5 – km 12.5), and further between the private land plots located from both side of the road.

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 (Krtsanisi 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.

166. 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.

The other alternatives discussed were the pavement options: rigid (concrete-cement) or soft (asphalt – concrete) pavement. The pavement variants were considered as alternatives. The lifetime of the rigid pavement is higher. For the section 3 these arguments were significant and the rigid concrete-cement pavement has been accepted<sup>13</sup>. In the environmental respect, the result of such a choice is the increased demand for concrete within the limits of the project. If the construction company decides to use its own concrete plant, it will not have to draft its own IEE and obtain the environmental permit to operate the concrete plant, however requirements of the technical regulations should be met.

---

<sup>13</sup> However, for Tbilisi – Phonichala section (section 1) following the technical and exploitation considerations, the choice was not the rigid bituminous concrete cover, but asphalt cover option has been selected, as the road is located within the Tbilisi City and often need of maintenance works on underground utilities, makes impossible application of rigid pavement of the road.



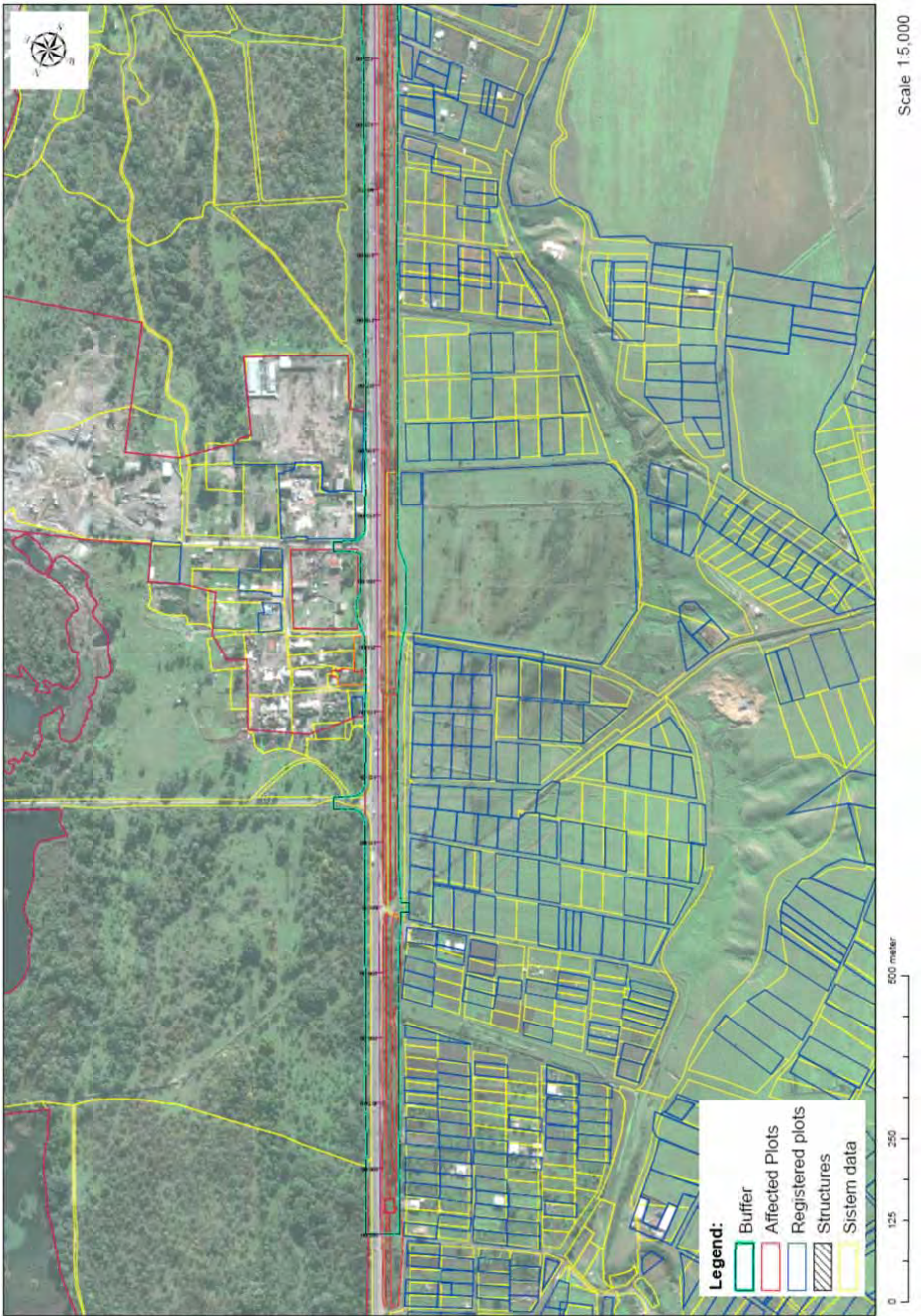


Fig. 6.1 Layout of the road and facilities buffer on cadastral maps



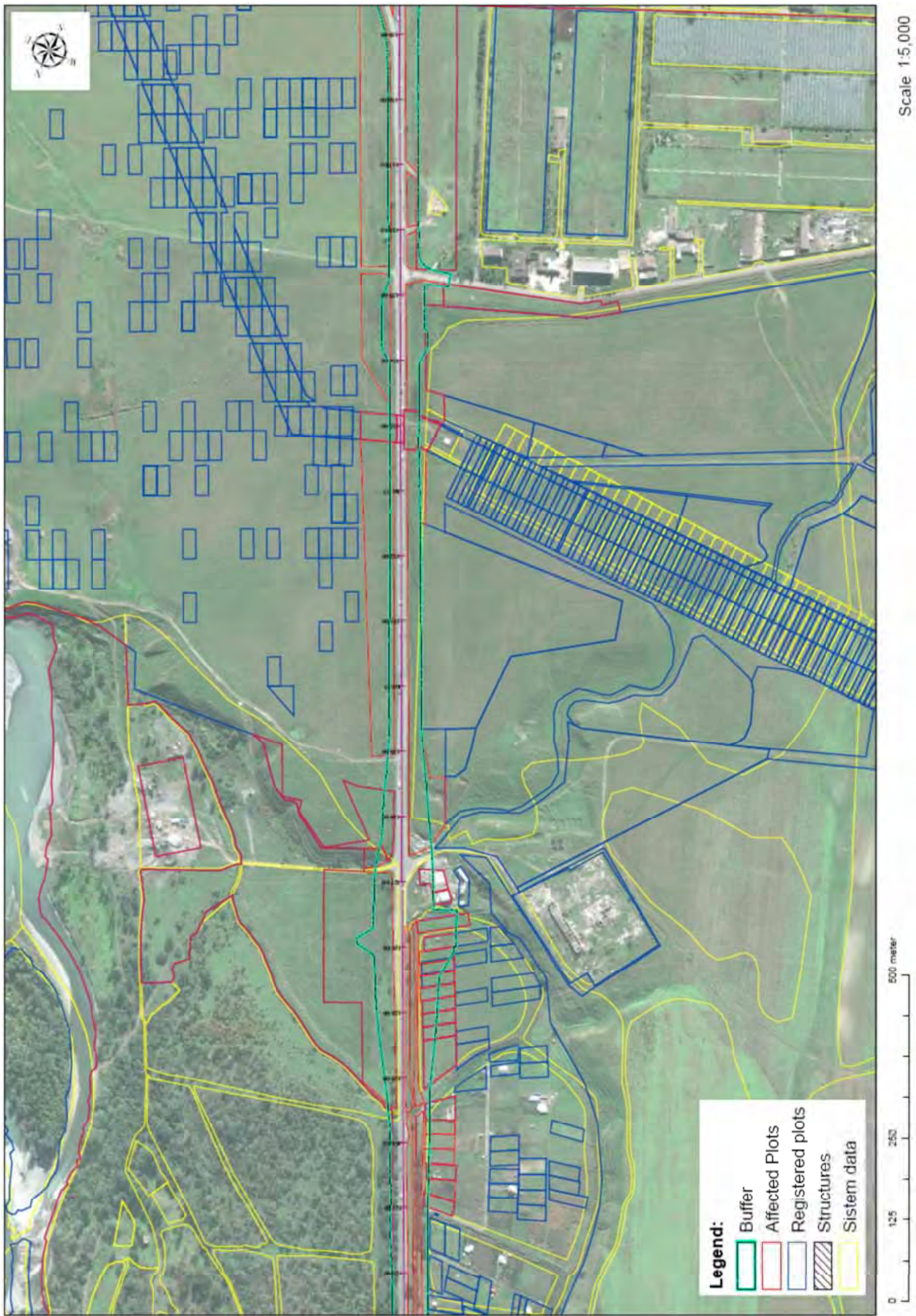


Fig. 6.2 Layout of the road and facilities buffer on cadastral maps



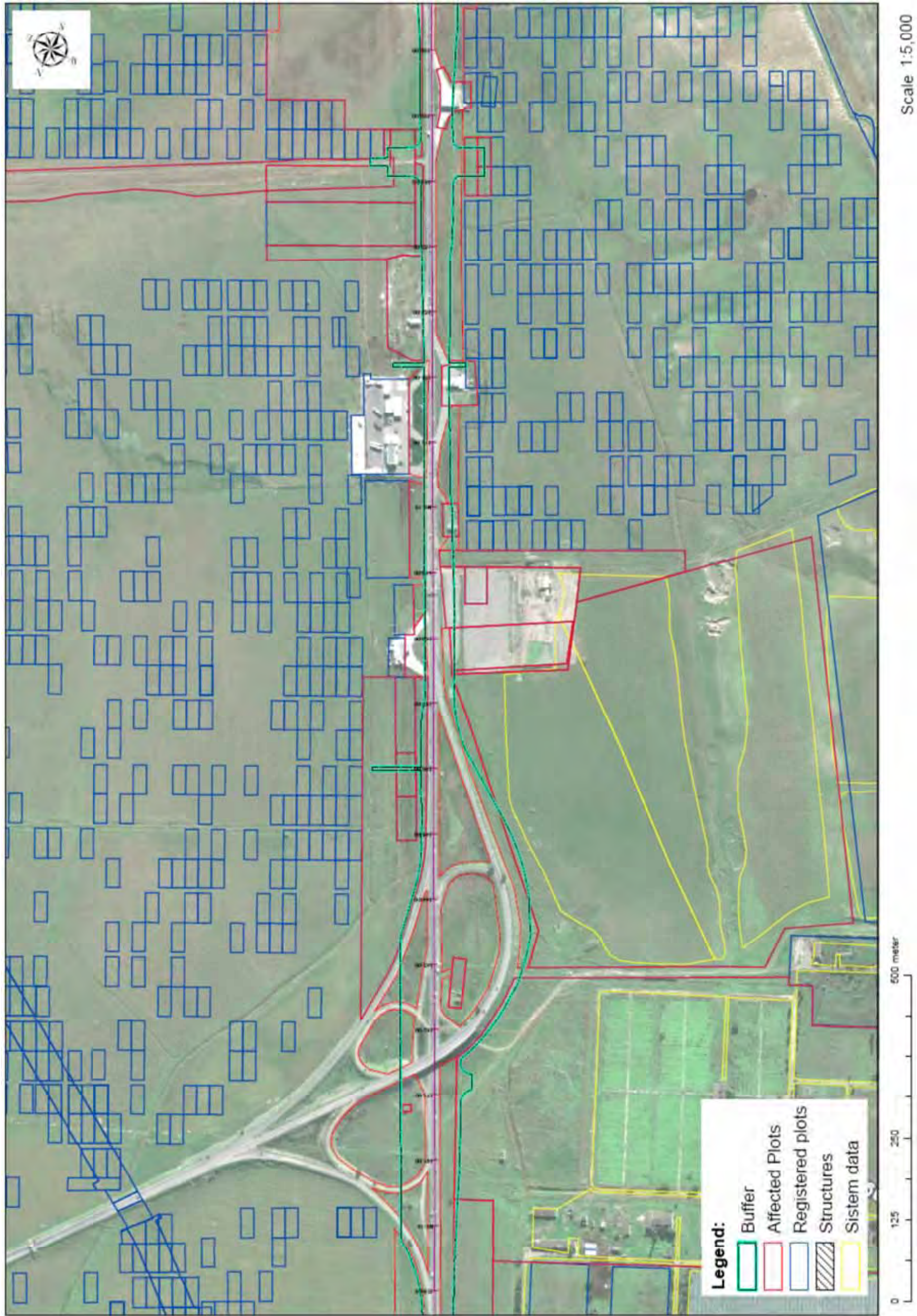


Fig. 6.3 Layout of the road and facilities buffer on cadastral maps



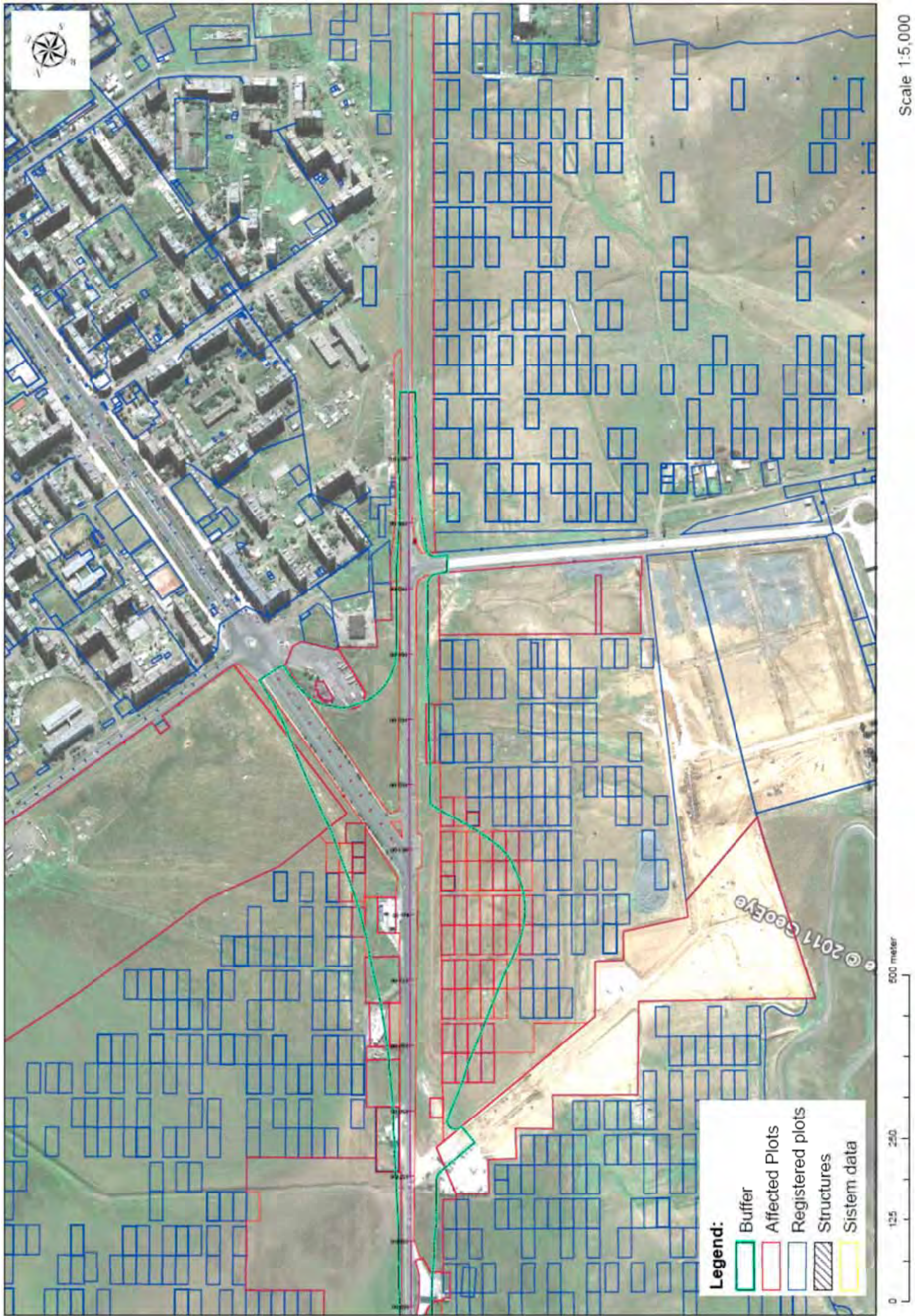


Fig. 6.4 Layout of the road and facilities buffer on cadastral maps



## 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.

#### 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 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	Particular sensitivities identified during design:  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 highway crosses several important infrastructure systems. The project envisages construction of interchanges  Following infrastructure elements should be relocated before starting construction of the road:. <ul style="list-style-type: none"> <li>• special crossing should be organized at the site of crossing BP's oil and gas pipelines.</li> <li>• Relocation of overhead power lines and substation</li> <li>• Relocation of gas-main pipeline</li> <li>• Relocation of optical fibre cable</li> </ul>
3	Location of borrow pits, waste disposal sites, any asphalt mixing sites, aggregate and concrete making facilities, workers camps, fueling 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	Interchanges and interconnecting roads and their planning and design	Interference with local transportation circulation and local access with increased traffic safety problems. Need to design traffic circulation plans in consultation with local authorities and Regional Roads Department.
6	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.

#### 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 highway.	Yes Minor	Road section from km 11.0 to km 17.0 narrow strip of Krtsanisi Park borders (km. 11.0 – 12.0)
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 Medium	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 and temporary sedimentation of natural drainage ways. Erosion of lands below the road bed receiving concentrated outflow from covered or open drains.	Minor	Near embankments.
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	<b>rivers</b> – r.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 highway	Minor	<b>rivers</b> – 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	r. 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 materials (e.g. Anthrax) during earth works near the pest holes (i.e. not registered Anthrax sites)	Yes Minor	Small puddles could be created along the whole alignment; larger pools could be created at the borrow sites and quarries;
15	Health hazards by noise, air emissions and dust raised and blown by vehicles during construction activities.	Yes Medium minor	Rustavi km 17.0 – 17.8
16	Impacts on Archaeological Sites only undiscovered archeological relics could be an issue	Yes	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 – 17.8

#### Character of Main of the Anticipated Impacts - Construction Stage

Activity	Impact	Character of impact							
		direct	Indirect	Positive	Negative	Reversible	Irreversible	Temporary	Residual
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	+			+	+		+	

Loan25655-GEO: Engineering,Procurement, Construction Management and Supervision  
Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red bridge (Azerbaijani Border) Road

	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		+		+	+		+	



#### CEnvironmental Impacts - Operations Phase

#	Air Pollution from increased use of the highway in future	Yes Minor increasin g	Site Locations
1	Noise Pollution from increased use of the highway in future.	Yes Minor increasin g	Whole alignment but particularly Rustavi km 17.0 – 17.8
2	Water quality deterioration with increased dust from highway surfaces to water courses	Yes minor	Whole alignment but particularly Rustavi km 17.0 – 17.8
3	Traffic safety problems	Yes	Whole alignment but particularly Rustavi km 17.0 – 17.8
4	Roadside litter.	Yes Medium	the level of safety will be improved
5	Soil and water contamination by oil, grease and fuel alongside the highway	Yes Minor	Whole alignment
6	<b>Potential Operation Phase Emergency Related Impacts</b>	<b>Yes/No</b> <b>Severity</b>	Whole alignment
	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 (see 'Public Health and Safety section)	Yes Medium	
7	Air Pollution from increased use of the highway in future	Yes Medium	Crossed settlements  Whole RoW

#### Character of Main of the Anticipated Impacts - Operation Stage

Activity/Factor	Impact	Character of impact							
		Direct	Indirect	Positive	Negative	Reversible	Irreversible	Temporary	Residual or long-term
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		+		+	+		+	

## 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 impact related to the emissions in the atmospheric air and relevant mitigation measures are among the important issues typical to the road projects. The issue of the emissions related to the road exploitation is discussed in details in Annex 3. Construction-related dust and emissions and relevant mitigation measures are described in paragraph 8.1.1.4. Below, we give a brief summary of automobile emissions analysis in terms of current and forecasted traffic intensity.

#### 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;

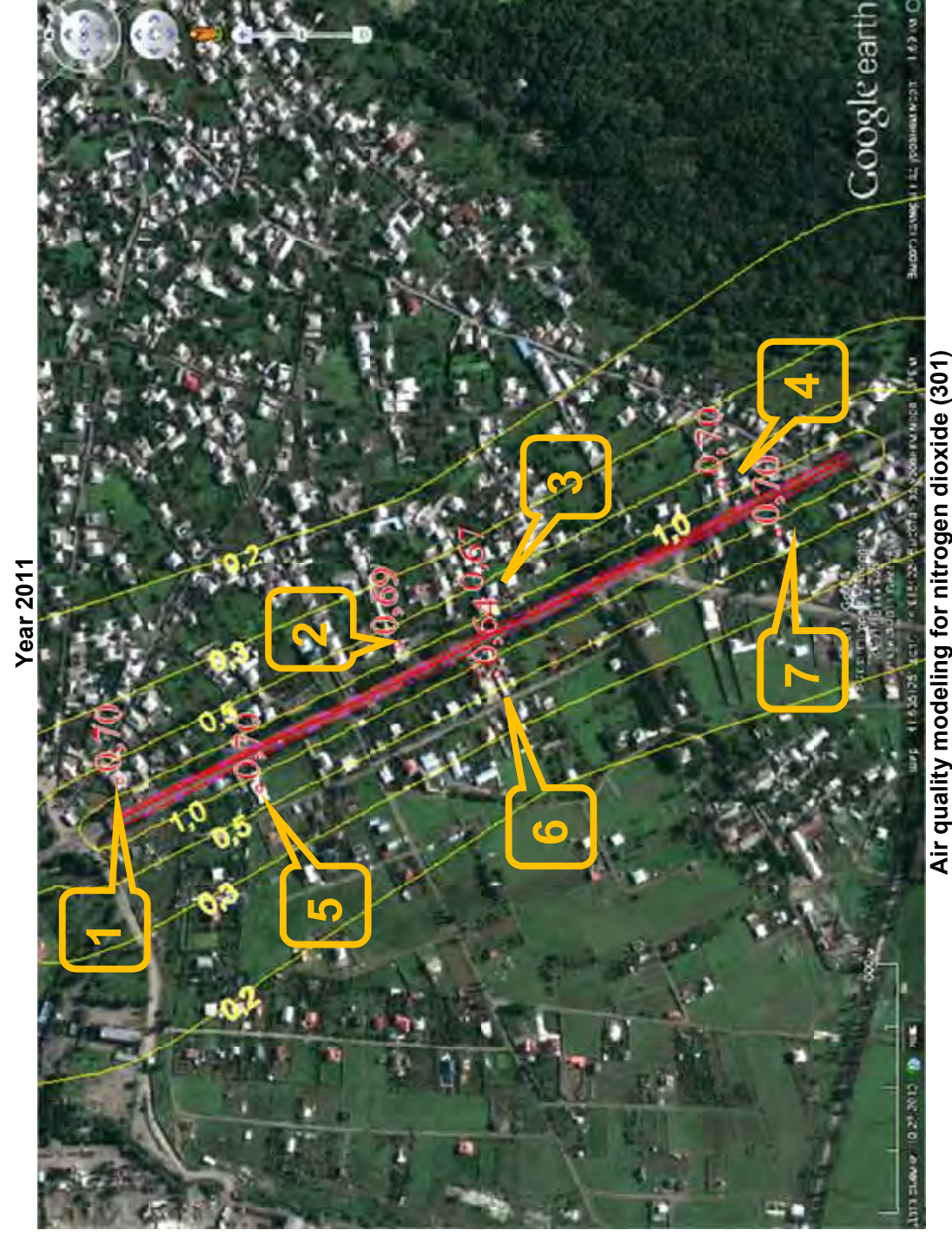
minibuses - 201 units; autobuses - 21 units and trucks - 18 units; dispersions calculated from this data [1] are given in the form of a table in Appendix #1.

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; dispersions calculated from this data [1] are given in the form of a table in Appendix #2.

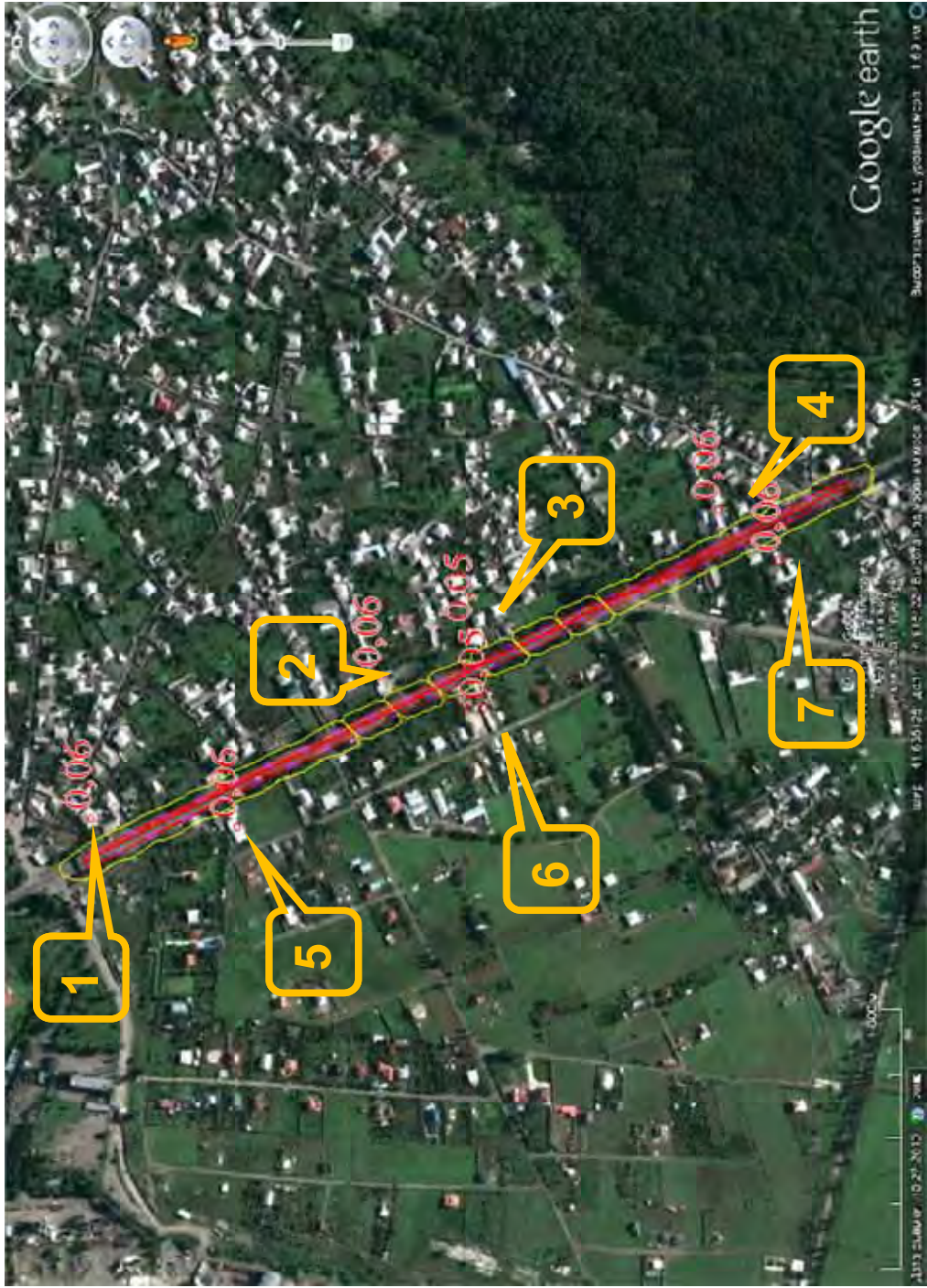
Air quality modeling was completed on the basis of calculated dispersion data [2] for pollutant substances within 1000 m section (calculation step – 25 m). The analysis of the results shows that standards are not exceeded in control points (nearest populated areas – 7 points) and the graphical and table data of these results are given below.

(Numbers imply maximum permissible concentration shares).



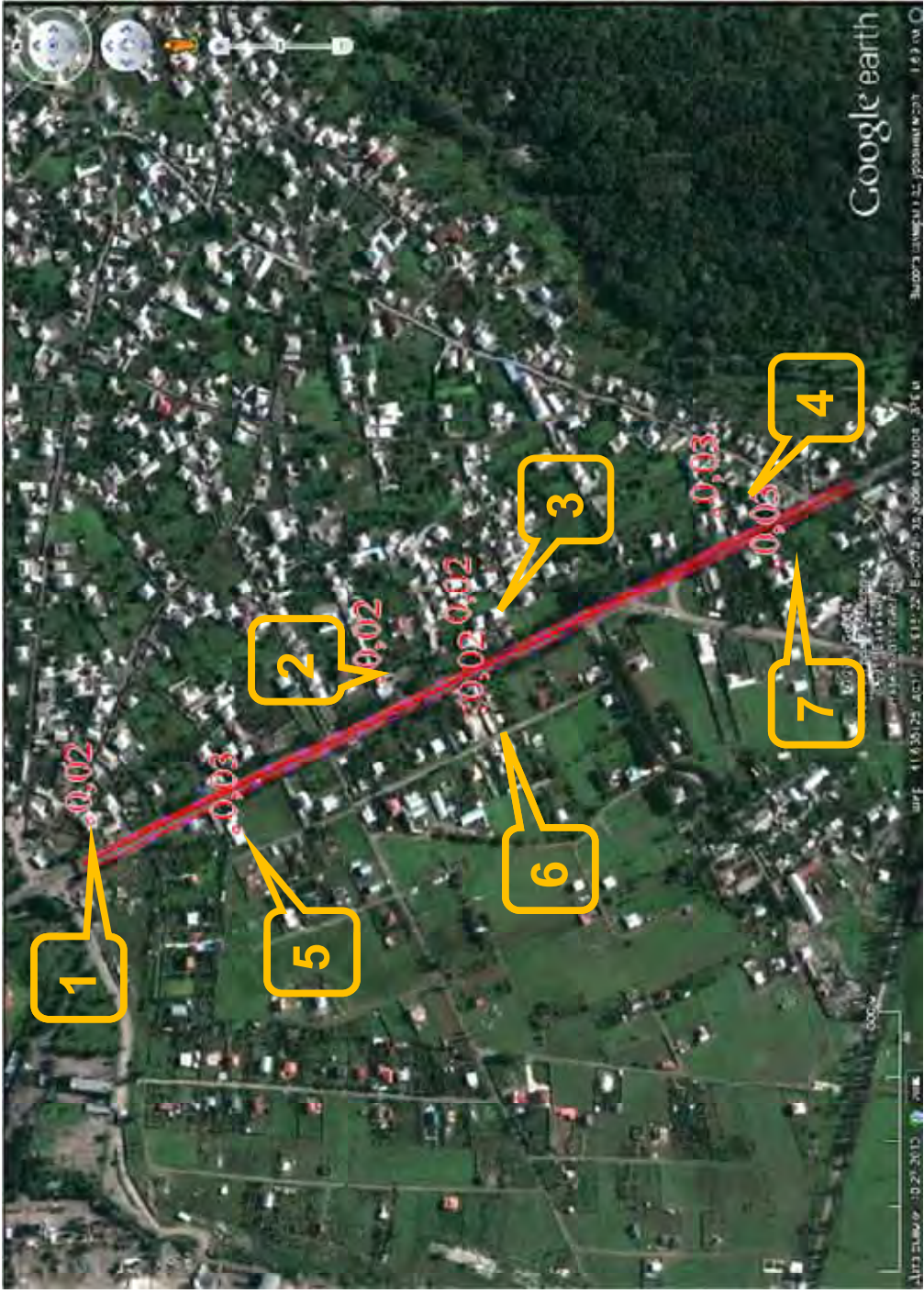






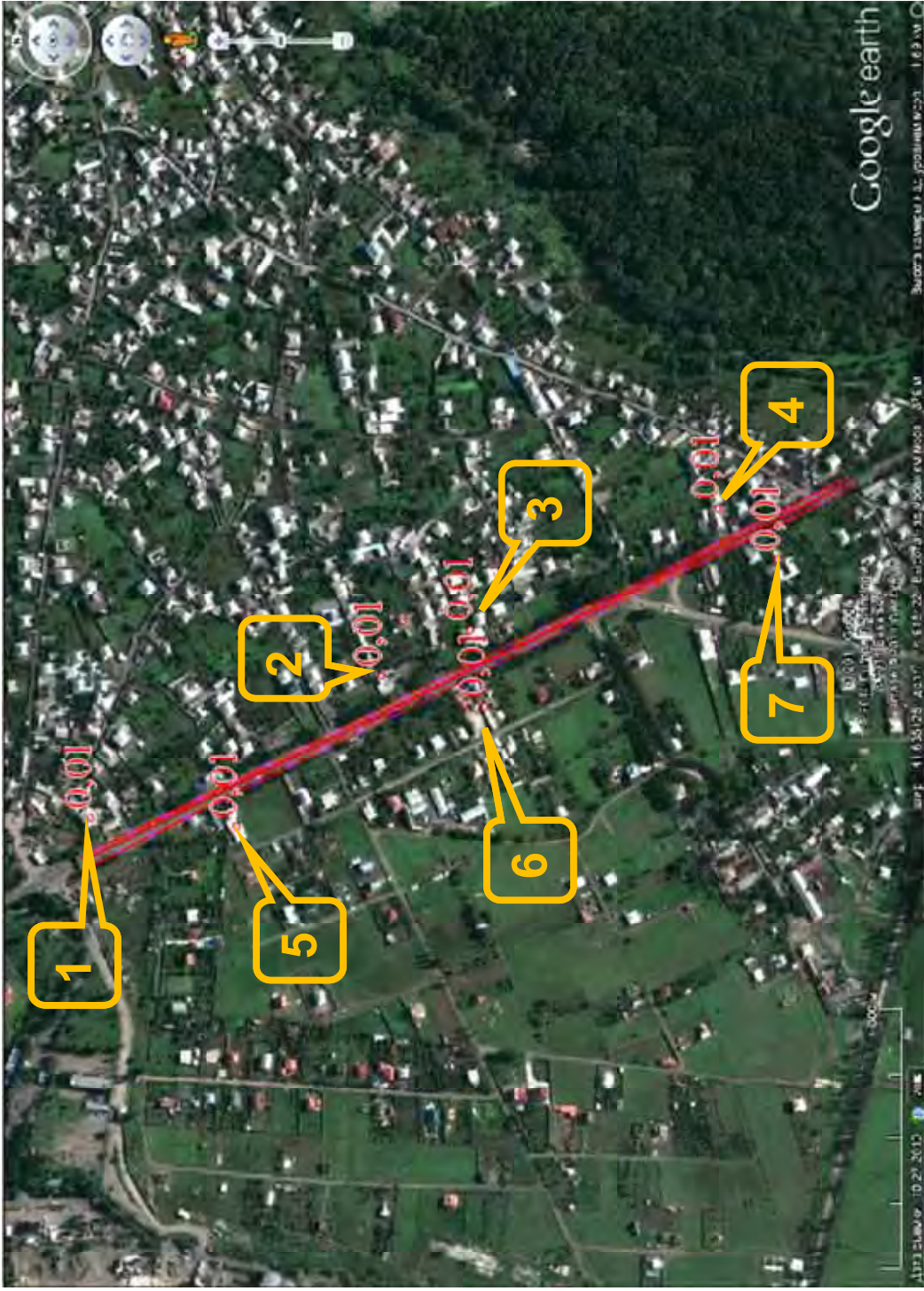
Air quality modeling for nitrogen oxide (304)





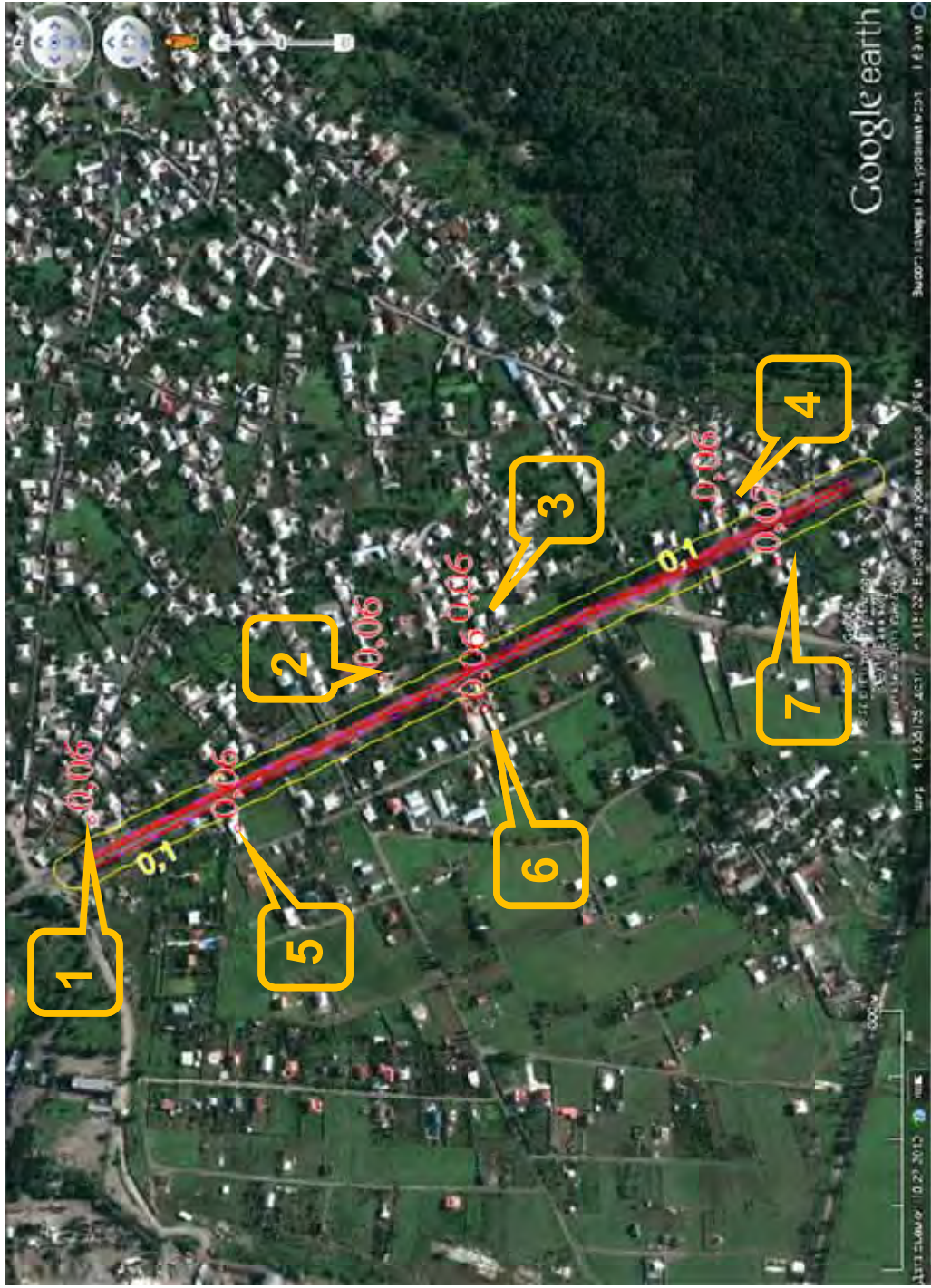
Air quality modeling for soot (328)





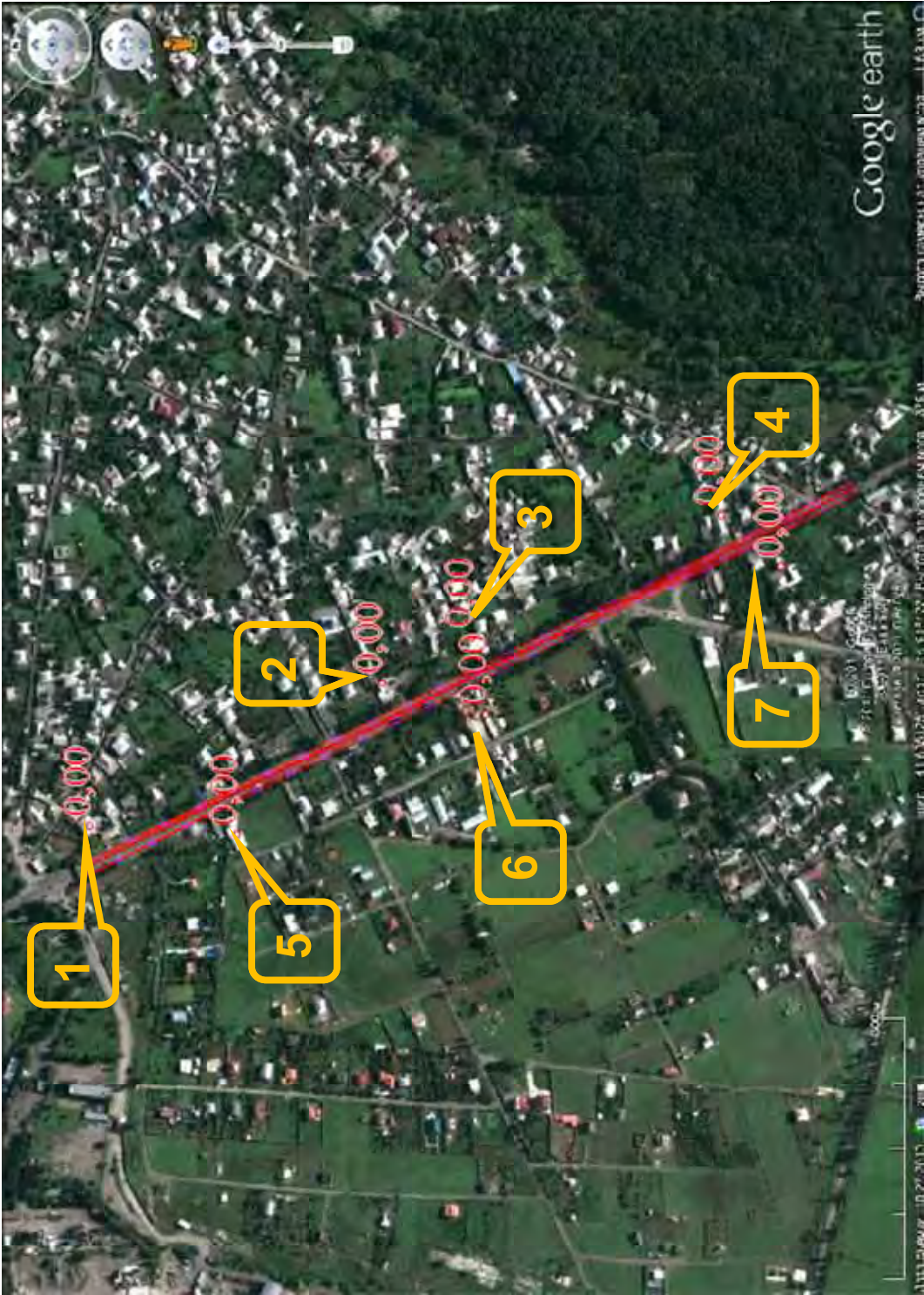
Air quality modeling for sulphur dioxide (330)





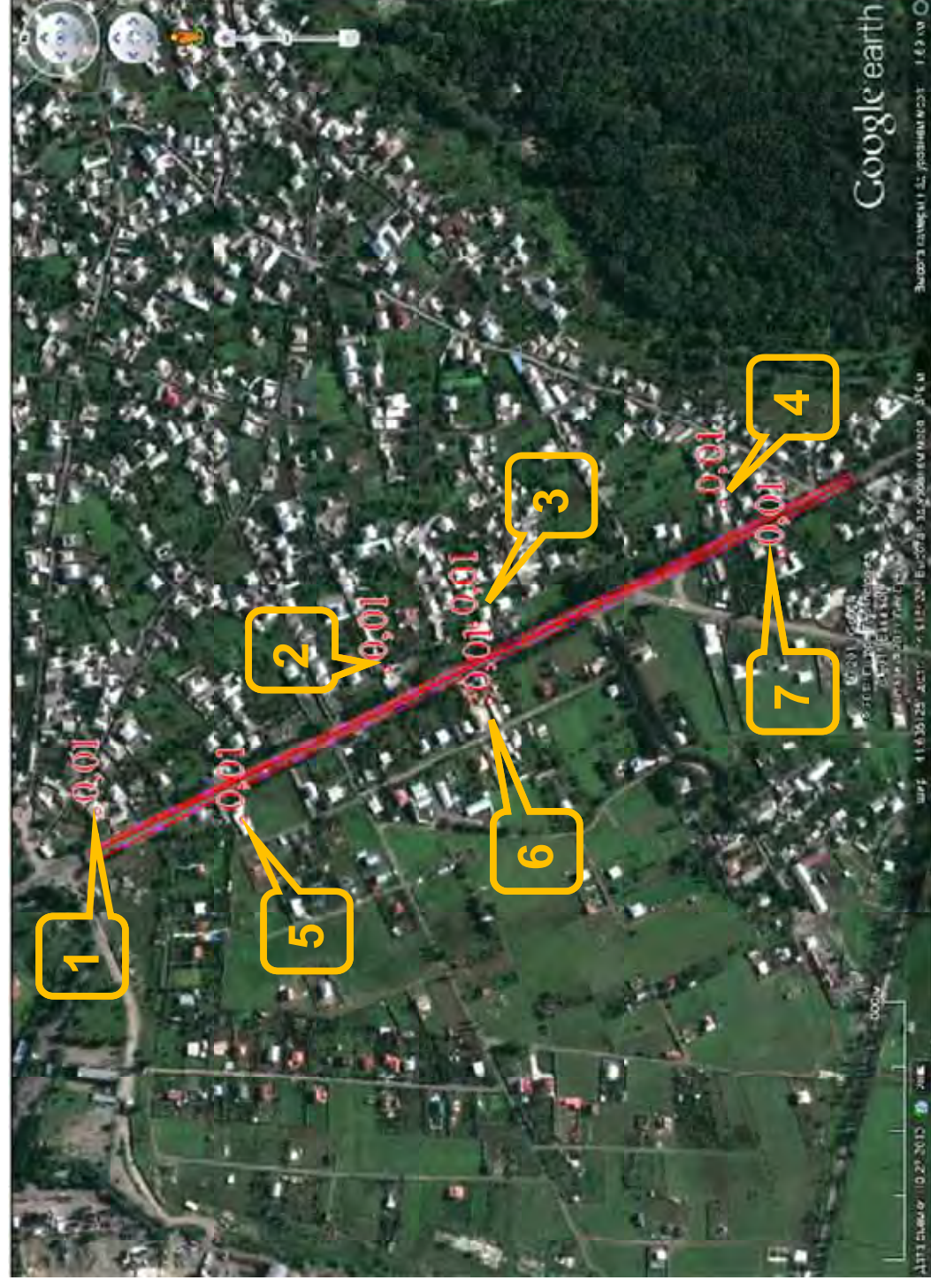
Air quality modeling for carbon oxide (337)





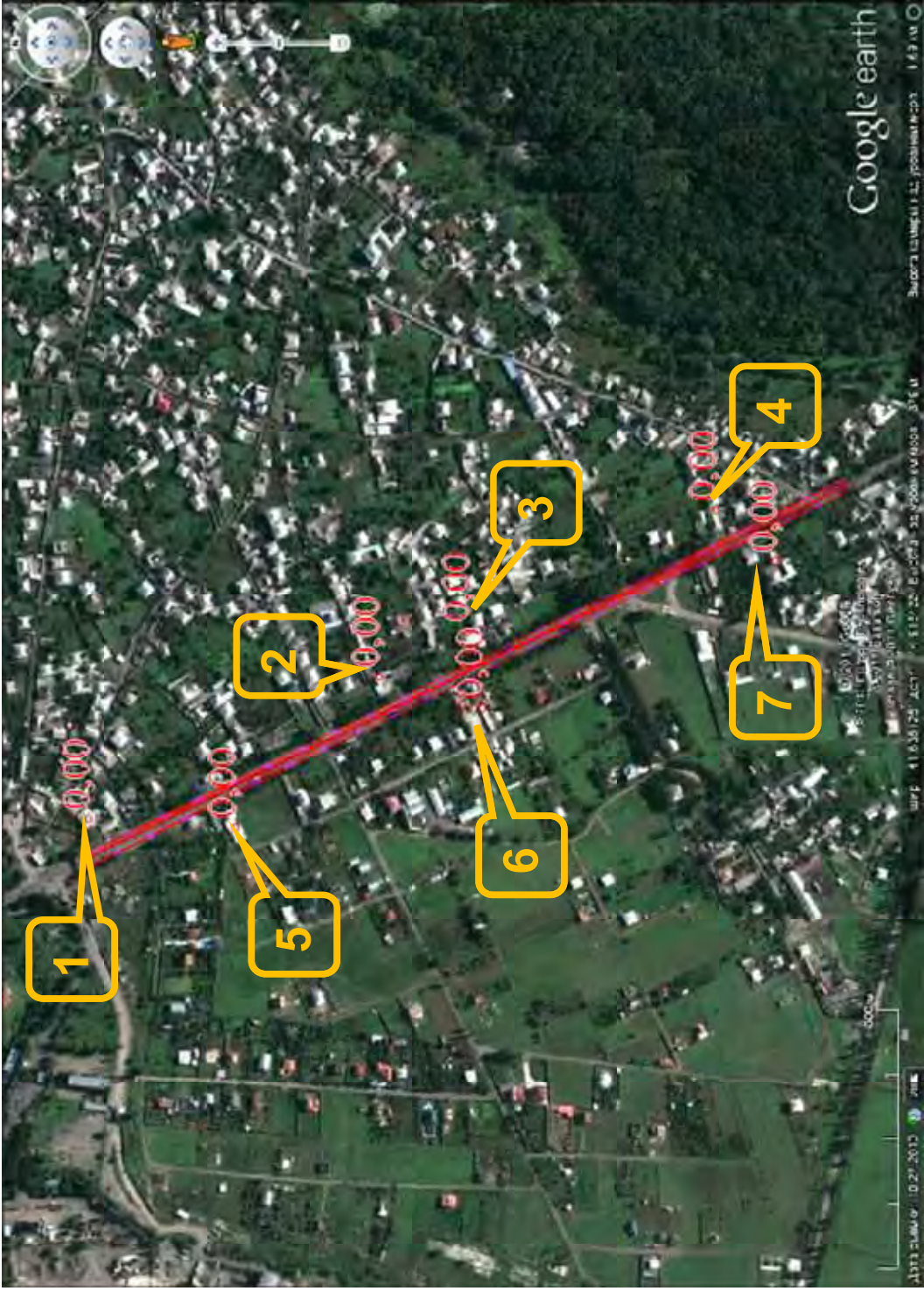
Air quality modeling for benzopyrene (703)





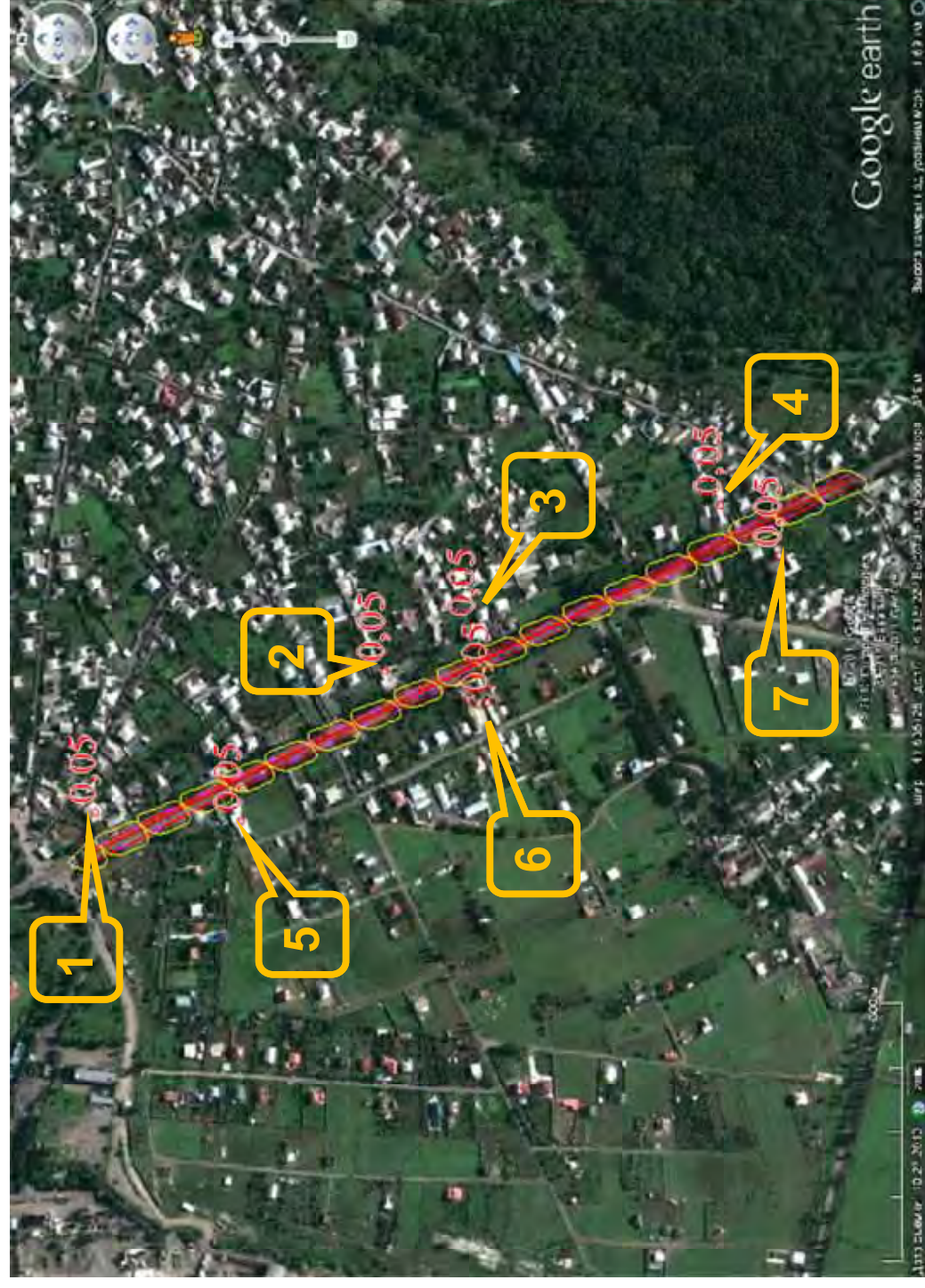
## Air quality modeling for formaldehyde (1325)





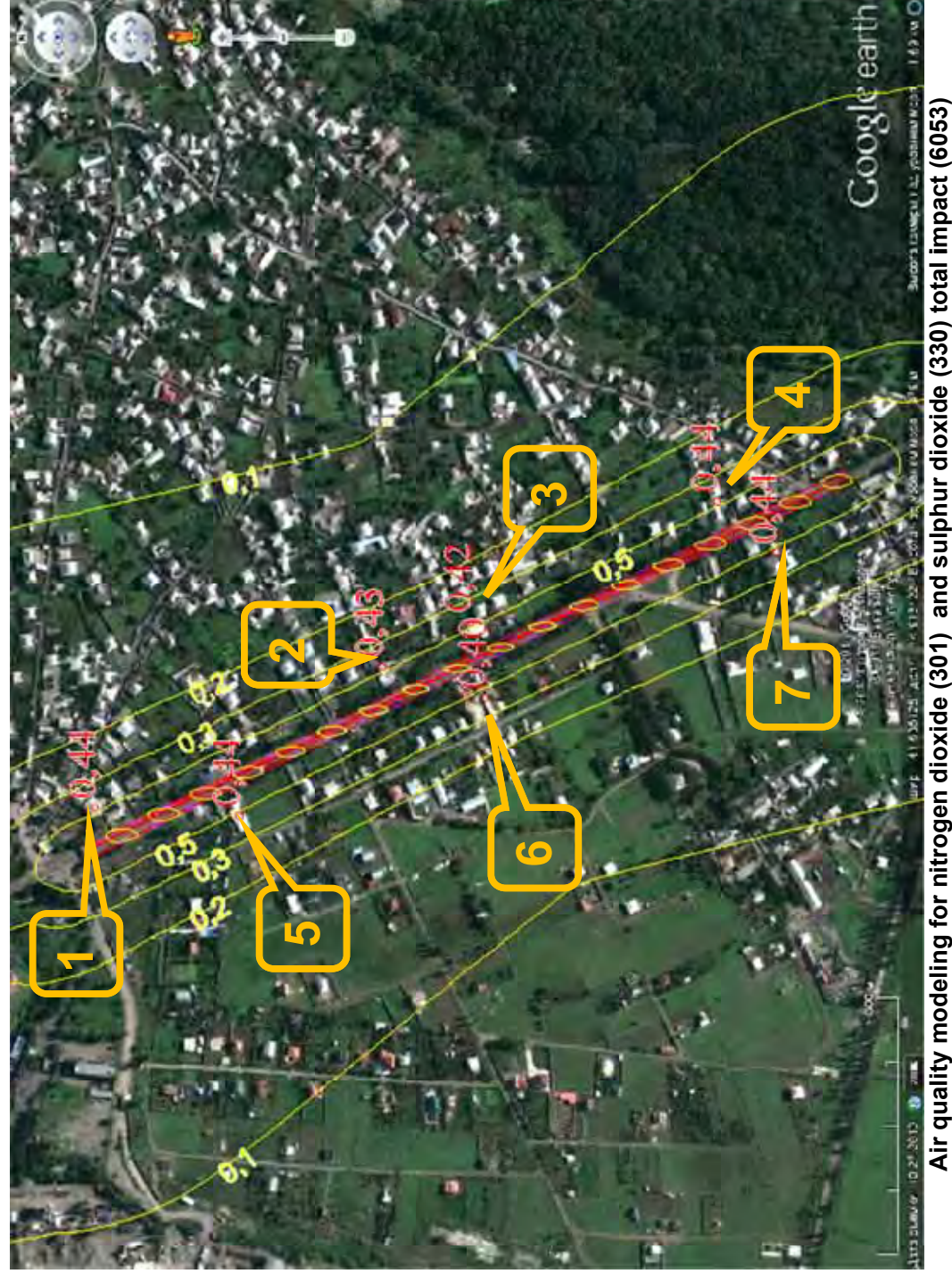
Air quality modeling for petrol fraction (2704)



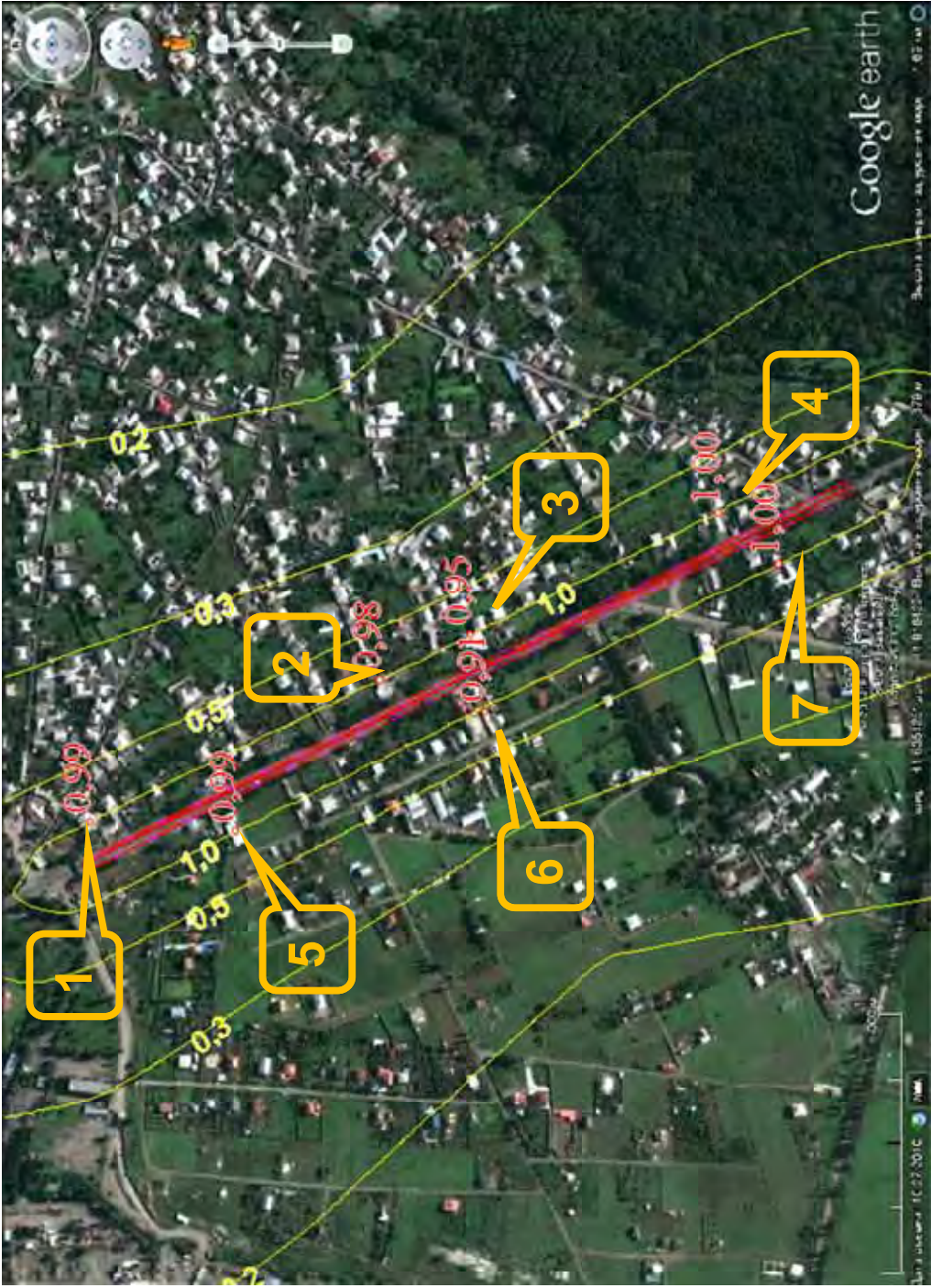


## Air quality modeling for paraffin fraction (2732)



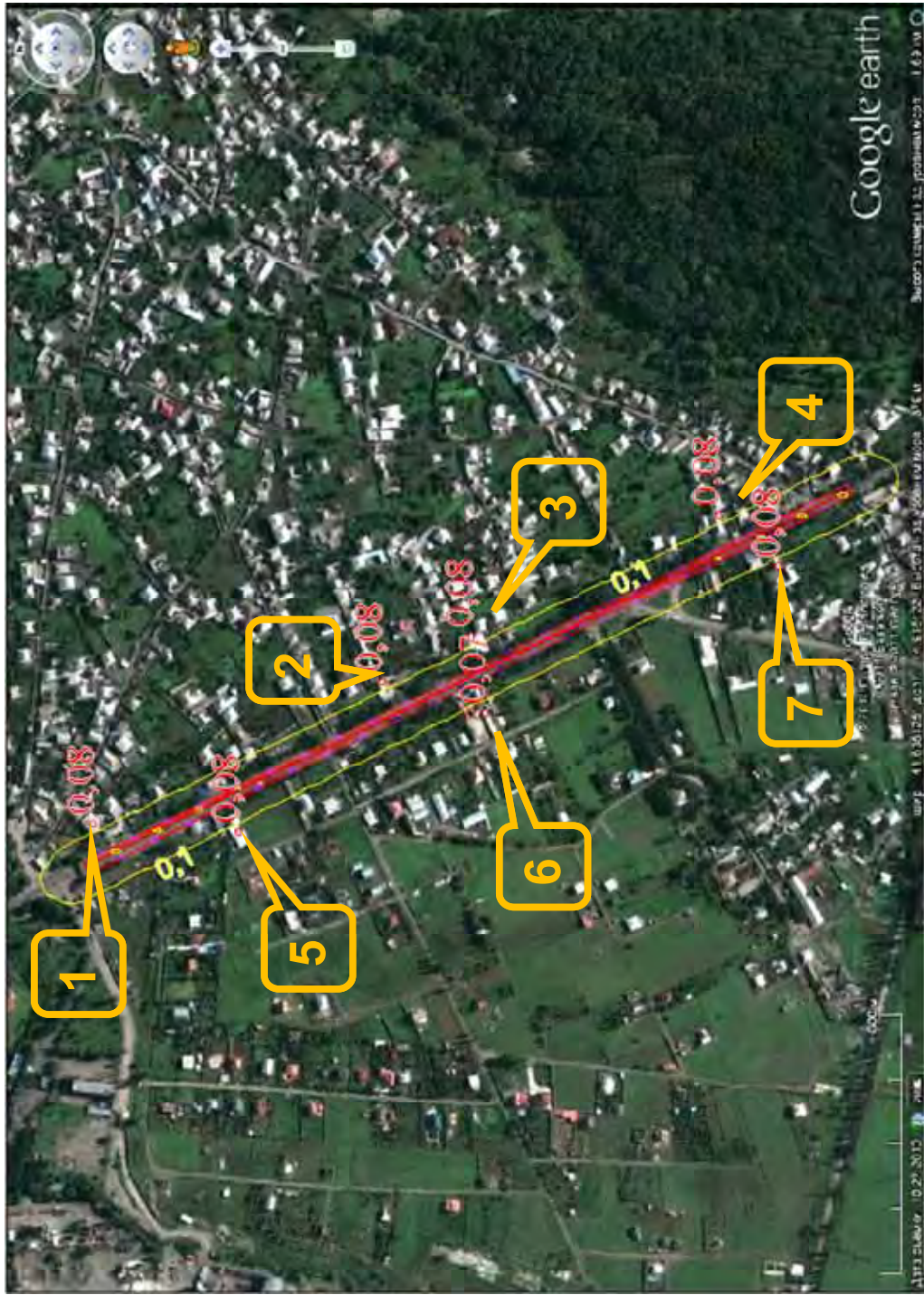






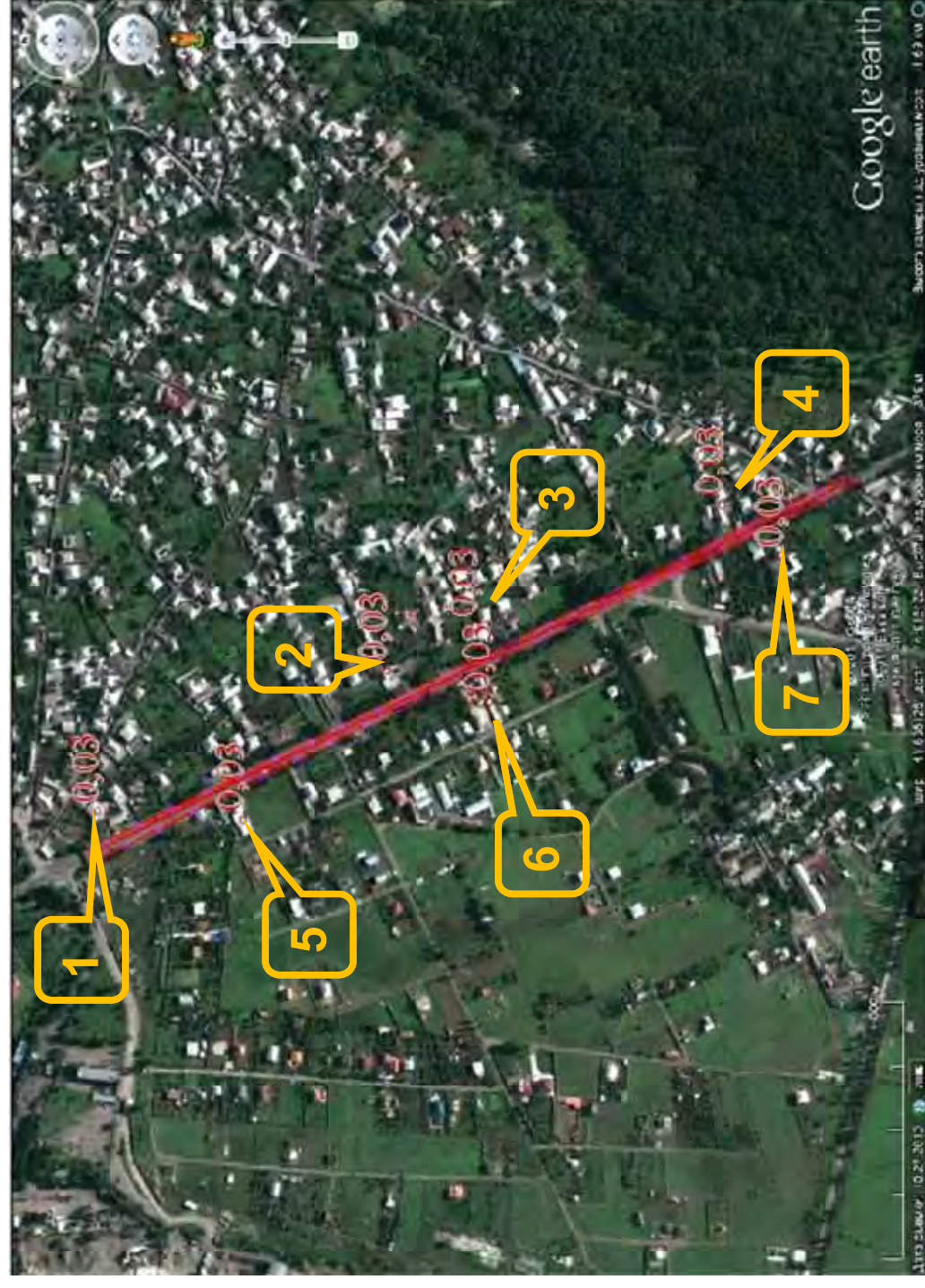
Air quality modeling for nitrogen dioxide (301)





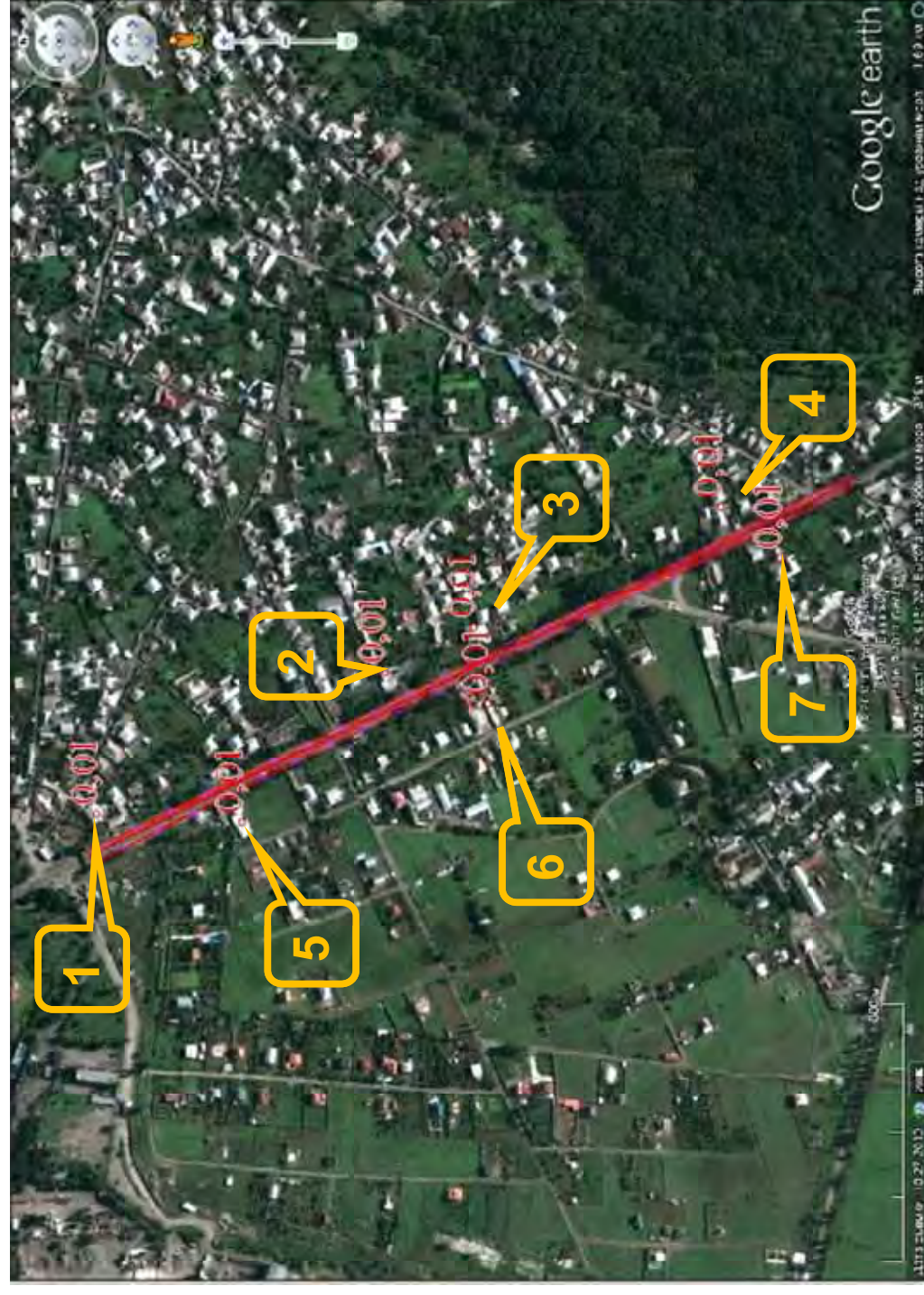
Air quality modeling for nitrogen oxide (304)





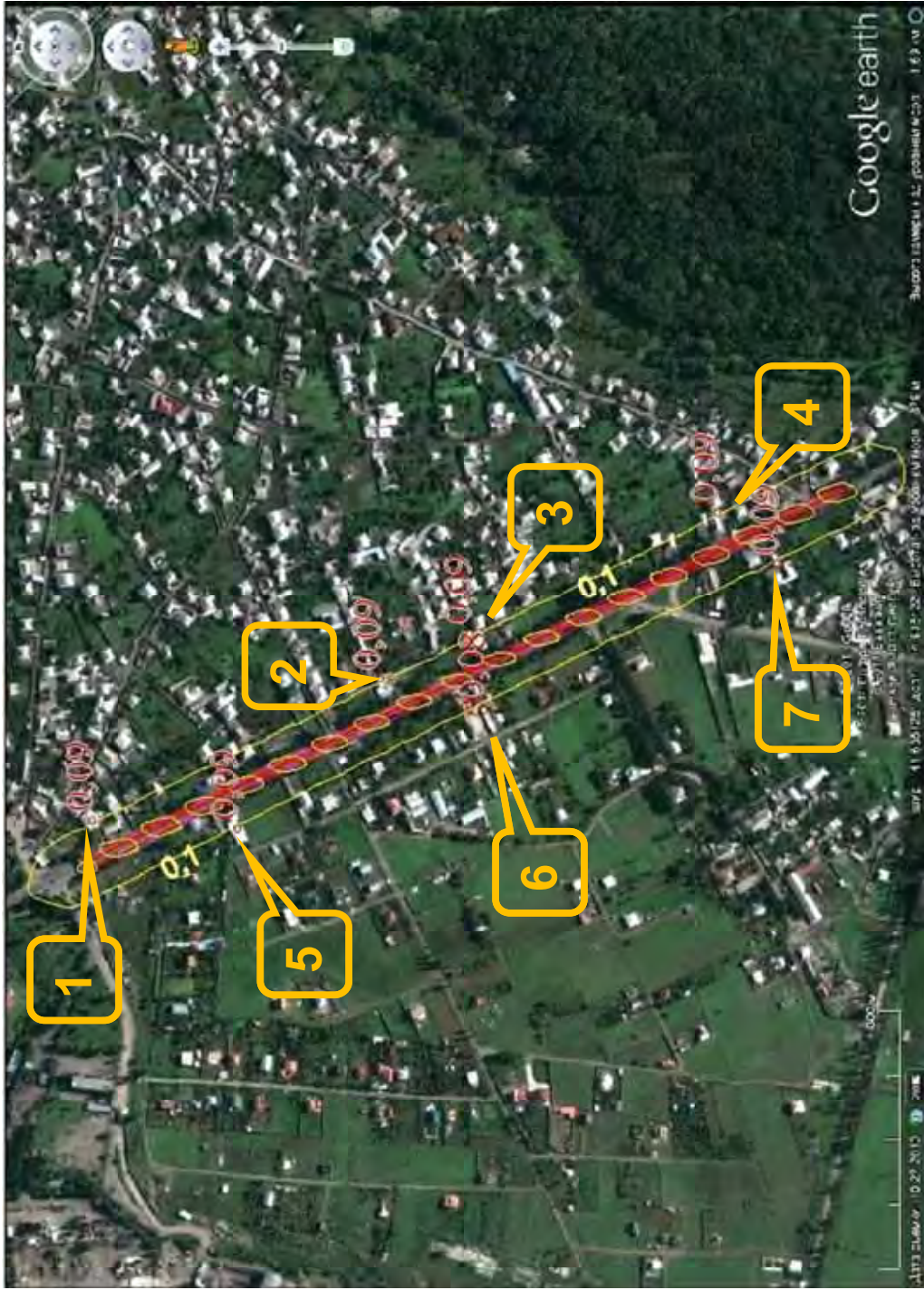
## Air quality modeling for soot (328)





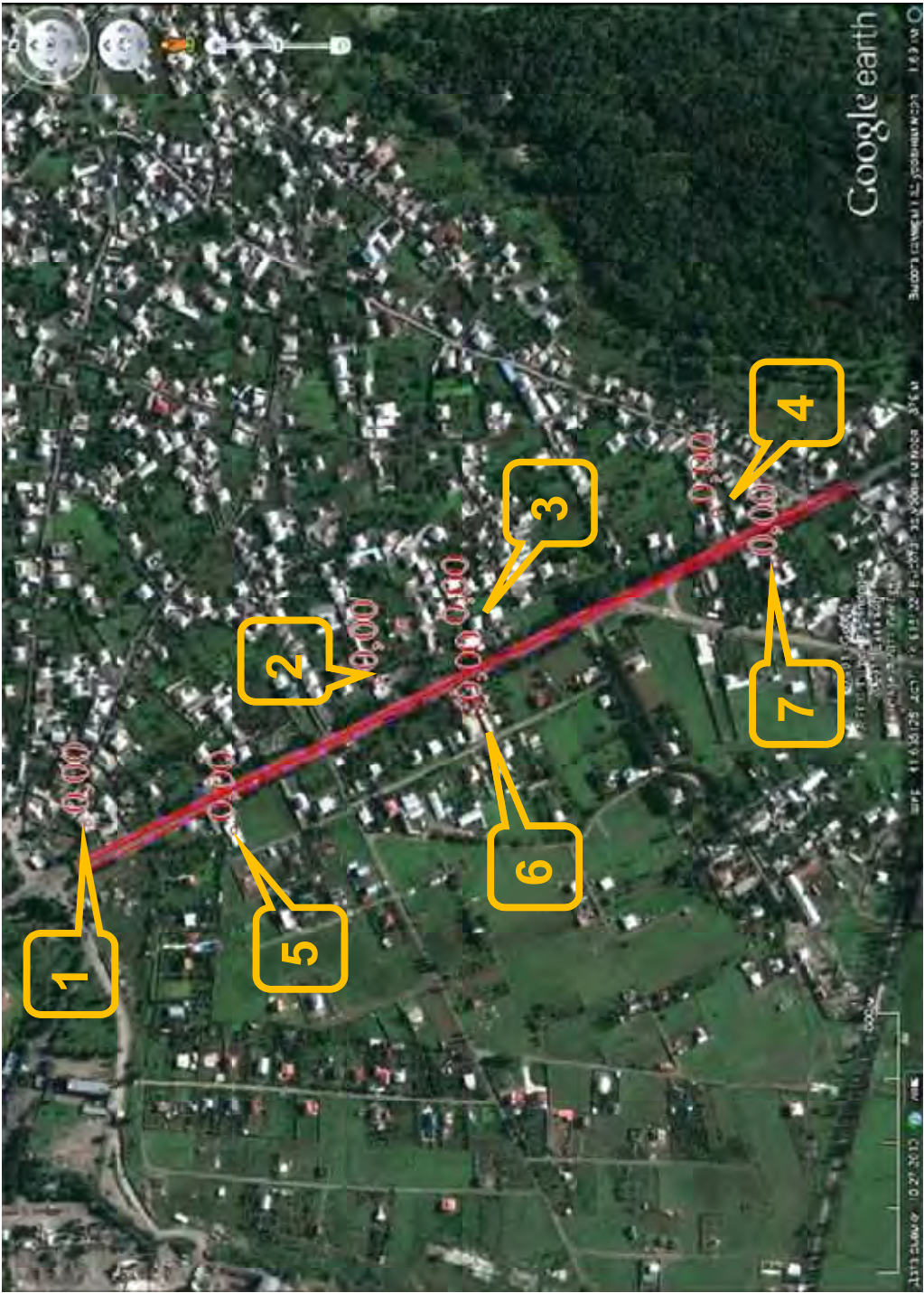
### Air quality modeling for sulphur dioxide (330)





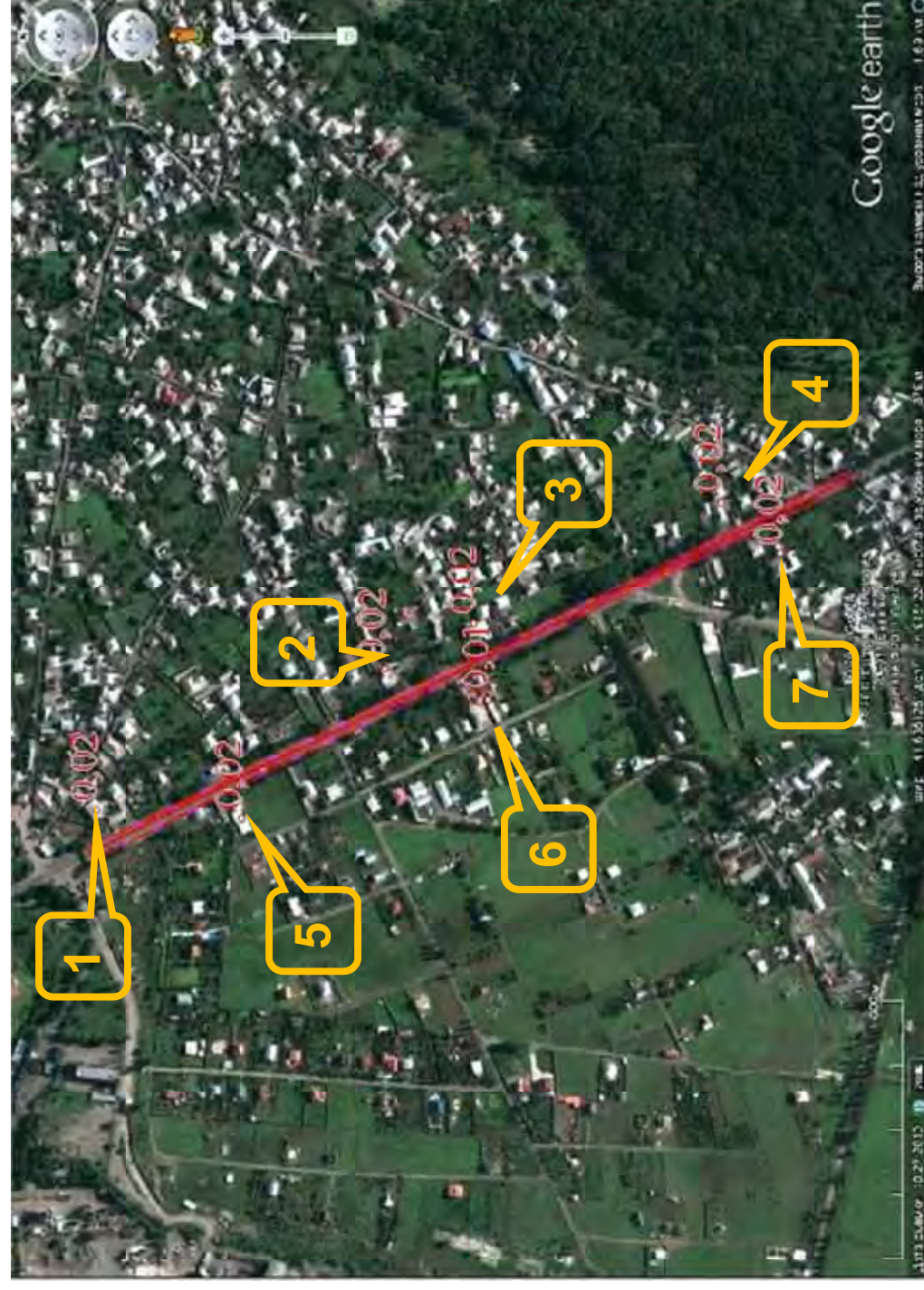
Air quality modeling for carbon oxide (337)





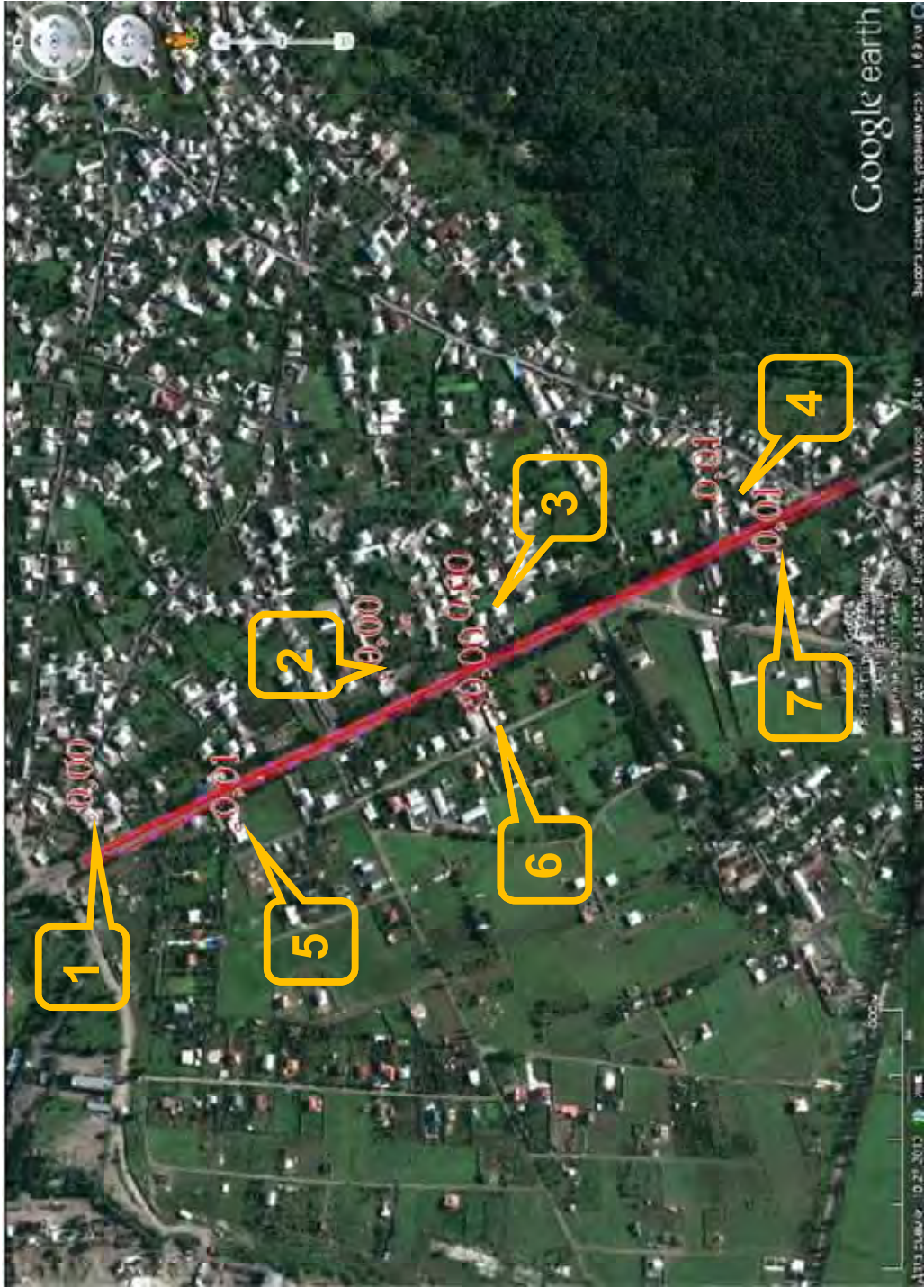
Air quality modeling for benzopyrene (703)





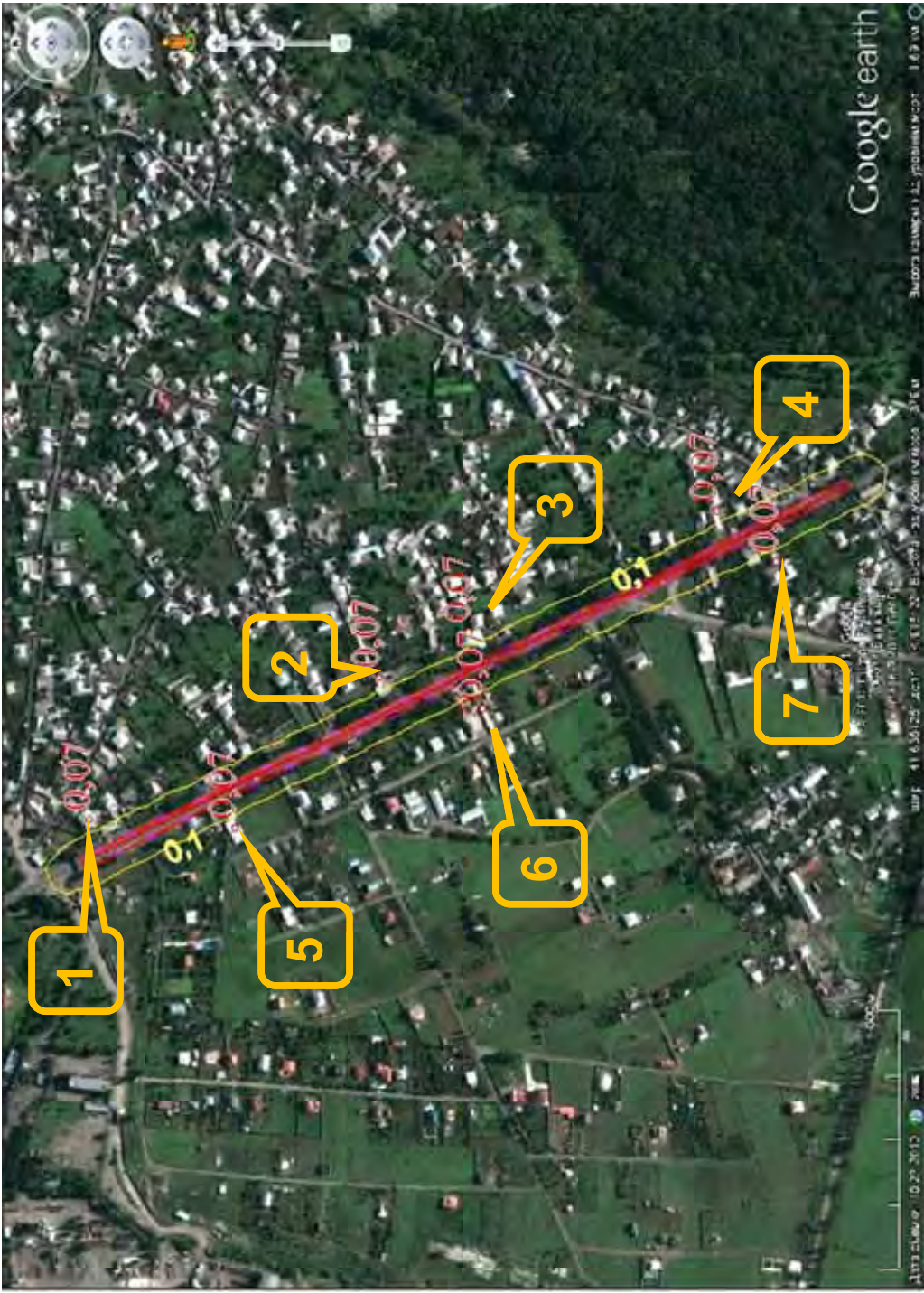
## Air quality modeling for formaldehyde (1325)





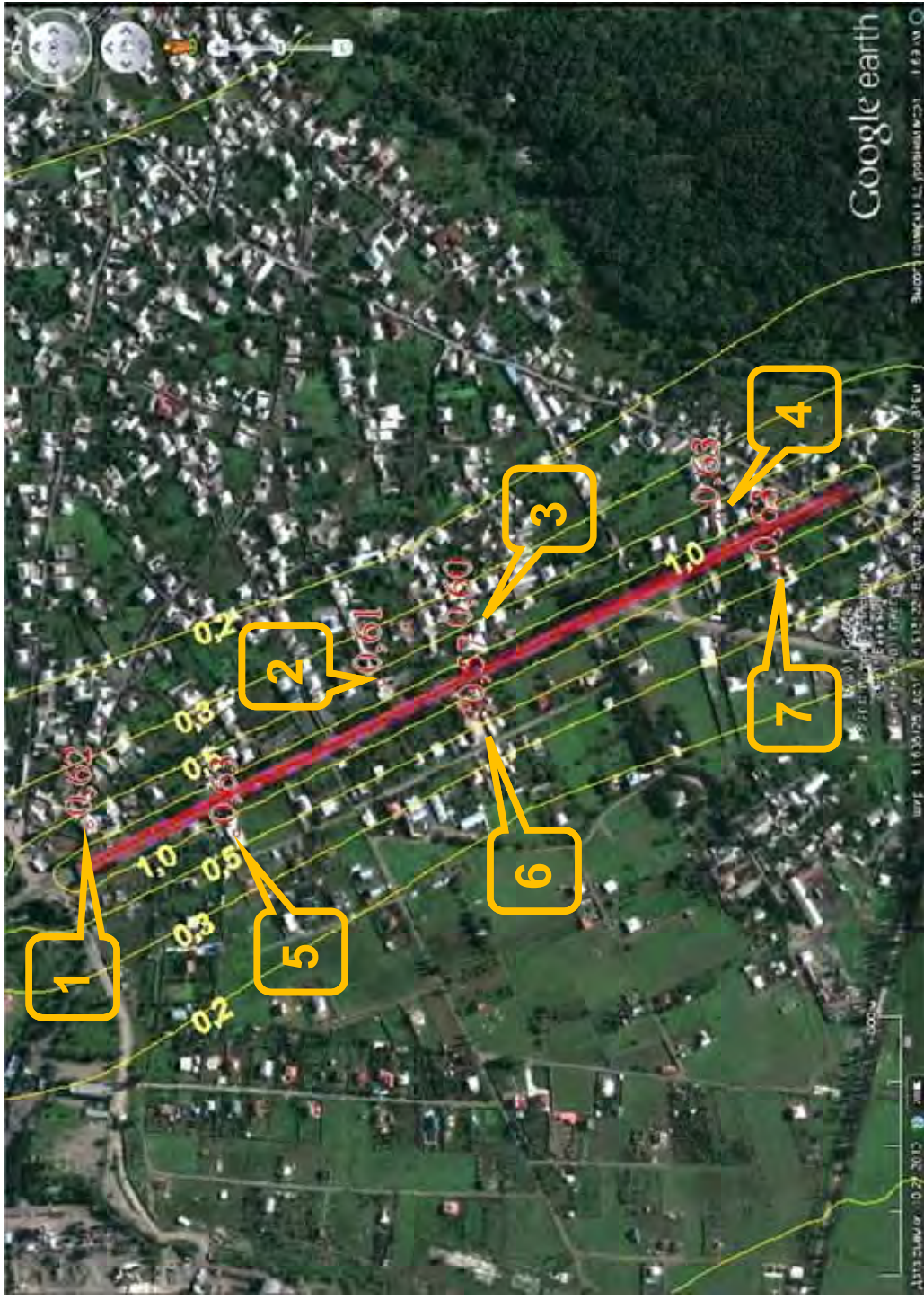
Air quality modeling for petrol fraction (2704)





Air quality modeling for paraffin fraction (2732)





Air quality modeling for nitrogen dioxide (301) and sulphur dioxide (330) total impact (6053)

#### General Conclusion:

**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.**

Table data on concentration at control points in 2011-2016 are given in Appendix # 3 and Appendix # 4.

#### 7.2.2 Noise Factor Related to Construction and Operation of the Road

##### 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 5.6 a**

Source of Noise	Equivalent noise level, dBA
<b>1. Construction machinery and mechanisms</b>	
backhoes	84 - 85
bulldozers	84 - 85
graders	91 - 92
compressors	80 - 88
jackhammers	85 - 98
pile drivers	96 - 107

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

**Table 5.6 b**

Source of Noise	Equivalent noise level, dBA
<b>Construction machinery and mechanisms</b>	
Compactors (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 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 level<sub>1</sub> – Sound level<sub>2</sub> = 20 log r<sub>2</sub>/r<sub>1</sub>. This means that for every doubling of distance, the sound level decreases by 6dBA (“inverse square law”).

**Table 5.6 c**

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 r<sub>2</sub>/r<sub>1</sub>. 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. The average and maximum data are presented in 4.1.3 Paragraph.

A.7.2 Table shows the noise levels specified by the law for various distances from the highway.**A.7.2 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.

### 7.3 Potential Impacts Related To the Construction Activities

#### 7.3.1 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.

##### 7.3.1.1 Construction Related Wastes

Various wastes will be produced throughout the construction process. The main waste producing areas are: construction sites and construction camps. 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 bypass the following types of waste will be produced:

1. Household;
2. Hazardous industrial;
3. Non-hazardous industrial;

#### 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 design road section is less compared with the other road sections.

- milled pavement - 11,880 m<sup>3</sup> (must be placed as a reserve and further used for asphalt pavement or repairs of other road sections)
- Only some of excavated soil will be used for fills. At least 95,330 m<sup>3</sup> of excavated and loose soil will be dumped in the disposal area.

The inert waste disposal areas will be selected by the contractor and agreed with the local authorities. The disposal areas suggested by the EIA team are discussed in 8.1.1.3 Paragraph below.

#### 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 <sup>3</sup> annually	to be transferred to the Contractor for disposal	Waste can be separated on site and some of it (paper, glass,	Contractor

*Loan25655-GEO: Engineering, Procurement, Construction Management and Supervision  
Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red bridge (Azerbaijani Border) Road*

				plastic) can be transferred to the Contractor for recycling or reuse.	
Office waste (sweepings, glass and plastic bottles, stationery)	non-hazardous	10-15 m <sup>3</sup> 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 <sup>3</sup> annually	Sewage is discharged into the sewer network based on the contracts		Contractor
Burned-out bulbs	hazardous	50-70 pieces	to be transferred to the contractor for disposal	1. returned to the manufacturer 2. transferred to the licensed contractor for recycling	Contractor
Printer cartridges	hazardous	2-3 pieces annually	Recharged 3-4 times and then transferred to the contractor for disposal	1. returned to the manufacturer 2. transferred to the licensed contractor for recycling	Contractor
Medical waste	hazardous	0.1kg annually	to be transferred to the contractor for disposal	to be transferred to the contractor for incineration	Contractor
Damaged or outdated tools	non-hazardous	1-2m <sup>3</sup> annually	to be transferred to the contractor for disposal		Contractor
Personal protection and clothes	non-hazardous	1 m <sup>3</sup>	to be transferred to the contractor for disposal		Contractor
oil soaked rags and absorbents	hazardous	The quantities depend on the oil spill scale 1m <sup>3</sup> annually	2. 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

### 7.3.1.2 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.

#### 7.3.1.3 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 watercourse 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 earthworks in a wet weather this may result in uncontrolled release of suspended solids from the work area. River Iori is the major receptor sensitive to the increased sediment load.

#### 7.3.1.4 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.

#### 7.3.1.5 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

### 7.3.2 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 1000 trees in the widened road sections. The vegetation mainly comprises a green belt along the highway. 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 two species listed in the Red List of Georgia, namely the walnut (*Juglans regia* L) and the Field Elm (*Ulmus minor* Mill). There are also rare, endangered and vulnerable species in the project area, including the silver berry *Elaeagnus angustifolia* (rare species), the Turkish Pine *Pinus eldarica* (endangered species), etc. The results of the botanical studies conducted prior to the construction need to be verified.

#### 7.3.3 Impact on Fauna

The project is not expected to have significant impact on the Fauna. The only species to be affected by the construction is bats. The impact can be mitigated by checking old buildings and

hollow trees prior to their demolishing or cutting. A simple acoustic method can be used to scare off bat colonies.

#### **7.3.4 Protected Areas**

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

#### **7.3.5 Landscape.**

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

**7.3.6 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 Rioni; groundwater resources). Water intake for construction works and particularly for the camp operations could be made from surface water sources or from groundwater sources (wells). 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). Intake of the groundwater for camp operations does not require obtaining of License for Use of Groundwater (according to the Law on Licenses and Permits, 2008). Wastewater discharge in surface water objects needs development of special document – Maximum Admissible Discharge Limits, which should be agreed with MoE and which determines limits for discharging wastewater with given concentrations of pollutants. 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 Labor, Health and Social Protection, while the Discharge Limits are calculated for each polluter of the surface water objects.

**7.3.7 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 artifacts 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.

#### **7.3.8 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
- Refueling, maintenance and vehicle cleaning and related risks of soil and water contamination

#### **7.3.9 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. Construction of new lanes may affect traffic on existing road. Proper organization of construction activities is crucial to mitigate these risks.

#### **7.3.10 Quarry-related Impact**

Fill volume – 285,080 m<sup>3</sup>.

Cut volume - 114820 m<sup>3</sup>

Filling materials to be transported from quarries and borrow pits for arrangement of the embankments - 285,080 m<sup>3</sup>

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.

#### **7.3.11 Construction Camp-related Impacts**

The experience of constructing other sections of E-60 shows that temporary works, e.g. a construction camp for accommodation of 200 workers (approx. 1.5 ha area), a yard for 100 vehicles and 150 units of heavy construction machinery like bulldozers, excavators, cranes, etc. (approx. 2 ha) and concrete plant (approx. 3 ha) need to be constructed.

The exact location will be selected by the Contractor. The potential impacts of the camp construction and operation are summarized below:

- potential damage to the humus topsoil;
- pollution caused by fuel storage and vehicle fuelling;
- waste and sewage management.

The design and operation procedures and conditions and optimum location options of the camp are detailed in 8.1.1.13 Paragraph of the EIA regarding the mitigation measures.

#### **7.3.12 Construction Related Impacts at the Concrete Plant and Gravel Crushing Facilities**

The road will be a cement concrete pavement and asphalt will not be used at all. Direct impacts of concrete plants and gravel crushing sites for concrete include landscape degradation, emissions, dust, noise etc. Gravel and any other supply materials needed for concrete production will be acquired through licensed operators.



Dust is most significant impact related to concrete plant operations and material supply and storage. Potential pollution of watercourses by cement slurry also should be considered as significant impact.

Dust emission and noise is characteristic impact associated with the operation of crusher facilities.

## **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 Geohazardous 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:

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 refueling 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 refueling process. All refueling 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 refueling 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. Refueling will always be carried out with the correct equipment (i.e. nozzles of the appropriate size), and only by suitably trained and experienced Refueling Operators. Fuel supply equipments will be regularly revised to prevent leakage due to inappropriate condition of refueling equipments. 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, refueling 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 no blasting operations and deep cuts are planned. Ground water pollution risk related to fuel leakages are 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.

#### **8.1.1.3 Construction 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.

The quantities of the milled pavement is – 11,880 m<sup>3</sup>. The reuse of milled pavement is possible and advisable. The milled pavement is stored in the borrow pit and reused in pavement construction or road section repairs.

Only some of excavated soil will be used for fills. at least 95,330 m<sup>3</sup> 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 lagluja disposal area, which is due to be closed. We recommend



to transport inert construction waste (spoil) to laguja 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 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).

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 bowsters with spray bars or other technical means; Minimum 2 bowsters will be required for that purpose. However, the constructing contractor should not be limited by this figure, and if required additional bowsters 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**

According to the design, the volume of fills is about 285,080 m<sup>3</sup>. Gravel filling materials are mostly needed for construction of embankments and this should be transported from borrow pit. The map of potentially usable licensed borrow pits is given in Fig. 2.3, Clause 2-8. 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. 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 revegetate 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 use 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 fueling and vehicle operation, should be the same as above described pollution prevention measures, but control on this sensitive site should be more strict. 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. The Road Department will control the licenses of Construction Contractors in case they are exploring some quarries and borrow pits.

#### **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°, 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°, 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). So far as very limited bush clearance and no woodcutting is required for the highway upgrading, preservation of top-soil is sufficient for reinstating the natural grass vegetation cover as well. Replanting of bushes and trees is considered below in a section “Landscaping and planting of greenery”.

#### **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.

In order to protect the sensitive habitats and endangered flora species, following actions are needed:

- Preentry survey in these sensitive zones prior to construction start up, in order to quantitatively assess the red data species presented within the zone and all trees to be felled.
- Exact demarcation of those trees that are subject for felling (to exclude cutting of other trees)
- Detailed taxation of the trees to be felled needed to comply with the procedure of Excluding the Project Land parcels from the Forestry Land Fund.

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

The construction Contractor and RDMRD, based on the preentry survey data, should apply all efforts to minimize the impacts on the red list species and accordingly refine the route. Inventory of each single specimen of the red data tree species remaining under the impact after the route refining should be conducted. The extraction of the red data tree species from the natural environment should be conducted according to the requirements of the Georgian Law on Red List and Red Book. Tree felling should be conducted in accordance with the procedures requiring change of category of lands attributed to the Forestry Fund. In case of building an object or infrastructure with a special state designation, the plant species included on the Red List can be removed from the nature only if the Ministry of Environment makes a decision on the removal of the Red-listed plant species from the nature. The request for obtaining such a decision by the Ministry of Environment can be made by the ministry envisaged by the Law of Georgia “On the Structure, Authority and Rules of Operation of the Government of Georgia”.

Trees can be cut down by observing the following rules under the law:

**Law of Georgia “On special protection of green plantations and state forest fund within the boundaries of Tbilisi and its environs”** regulates the procedure to protect the forest fund and forest fund grounds within the boundaries of Tbilisi and its environs and determines the rule to compensate the damage inflicted by damaging, destroy or digging out the green plantations within the boundaries of Tbilisi and its environs.

1. Privatization of the forest fund and forest fund grounds within the boundaries of Tbilisi and its environs or their use in any other manner, as well as changing a category of the green plantations is prohibited except in cases envisaged by the present law.
2. The use of the state forest fund within the boundaries of Tbilisi and its environs is admissible only for allocation purposes as well as when conferring the state forest fund the category of a special designation, and the deduction of the areas out of the state forest fund within the boundaries of Tbilisi and its environs is admissible under the rule established by the legislation of Georgia.
3. Conferring the category of a special designation to the state forest fund within the boundaries of Tbilisi and its environs and its allotting for special forest exploitation purposes is admissible only for the purposes envisaged by the legislation of Georgia (except ore mining), with the relevant decision made by LEPL Agency of the Natural Resources, which is a part of the Ministry of Power Engineering and Natural Resources of Georgia.

The prohibited activities with the state forest fund and state forest fund grounds within the boundaries of Tbilisi and its environs are as follows:

- a) Construction, except for the allocation purposes or construction in the specially designated areas;
  - b) Tree cutting to gain the material timber, except dry, withering and rotten trees;
  - c) Plantation business;
  - d) Issuing an exploitation permit for hunting industry.
1. Within the administration boundaries of Tbilisi (except the protected areas), a recreational zone with a special regulation can be established by the decree of the President of Georgia.
  2. The decree envisaged by the first clause of this article is issued by the President of Georgia based on the application by Tbilisi Mayor, which is agreed with the Ministry of Environment of Georgia.
  3. Within the administration boundaries of Tbilisi (except the protected areas), an area can be given a status of a special recreational zone with a special regulation only to realize the projects, whose main aim it is to protect the green areas and/or planting the areas.

The standards to use the areas with the status of a special recreational zone with a special regulation, the necessary requirements for improving and building the given areas, the plant species to be grown on the areas as well as the boundaries and area of the areas are determined by the decree of the President of Georgia.

#### **8.1.1.9 Protection of Fauna**

##### **Construction Phase**

The project is not expected to have significant impact on the Fauna. The only species to be affected by the construction is bats. The impact can be mitigated by checking old buildings and hollow trees prior to their demolishing or cutting. A simple acoustic method can be used to scare off bat colonies.

Pits, trenches and similar should be limited by some barrier to prevent falling of animals into them – i.e. large band of color distinctive to the species, any flat material for small animals: tin, polyethylene, etc. Long boards or logs should be put in pits and trenches at night so that small animals are able to get out. Pits and trenches should be checked prior to land filling

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.)

#### **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 archeological interest, destruction of archeological layers during the construction process is possible (although unlikely). To avoid this risk, archeological 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 archeological 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 archeological research of the territory in question. The preliminary research should include field-research and laboratory works. In case of identifying an archeological object on the territory to study, the conclusion of the archeological research should contain the following information: (a) a thorough field study of the archeological 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 archeological 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 archeological supervision and other agreed works should be fixed under the construction works appraisal.

Chance Finds Procedure:

##### **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 artifacts, 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 unfavorable 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 labor protection and safety requirements as well as industrial sanitation requirements.

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

In order to efficiently organize the works, it is necessary to build the auxiliary buildings and premises to be designed and built by the contractor. The current project design does not include these facilities. Design and location of these facilities is within the competence of the Construction Contractor. Accordingly, the present IEE is not covering project-specific mitigation

measures in that respect, but provides only generic recommendations on legal procedures and mitigation measures, as well as standards applicable for the project.

The decision regarding the concrete plant will be taken by the Construction Contractor. He may chose to use existing suppliers of the concrete operating in the region. In this case the requirement to be met is that only licensed suppliers having all required permits are used. The other option is that Contractor decides to install his own concrete plant. In this later case, the Construction Contractor is obliged to be compliant with the Technical Regulations adopted by Moe.

In line with the legislation of Georgia, the other facilities (construction camps, vehicle fleet etc.) are not subject to the environmental permit. However, the Construction Contractor has to comply with certain standards and regulations. Designing and the selection of territory must be undertaken under the following normative documents effective in Georgia:

- Resolution No. 57 of the Government of Georgia of March 24, 2009 “About the rule of issuance of a building permit and terms of permit”.
- Decree No. 1-1/1254 of the Minister of Economic Development of Georgia of July 8, 2009 “Relating the approval of the principal provisions to regulate the use and accommodation of the territories with settlements”.
- Decree No. 1-1/251 of February 18, 2010 of the Minister of Economics and Sustainable Development of Georgia “On the use of the norms, rules and other of documents of technical regulation in the field of technical supervision and construction on the territory of Georgia effective before 1992”.
- SNiP2.07.01.–89 Urban planning
- SNiP2.08.02.–89 Public buildings and premises
- SNiP2.09.03.–85 Premises of the industrial enterprises
- SNiP2.09.04.–87 Administrative and domestic buildings.
- Decree No. 745 of the Minister of Environment Protection and Natural Resources of Georgia of November 13, 2008 “On the technical environmental regulation”

The complex of auxiliary buildings includes a living camp, fleet and concrete plant.

The propose traffic management scheme solves the traffic disruption problems within each of the subproject (section 1 and section 3). 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.

### **The Worker's Camp**

The camp has an office, living, domestic and catering units.

When building the living camp, drinking and domestic water-supply should be considered. A pipe or pit well can be made on the selected territory and the camp can be supplied with fresh underground water. In line with the effective legislation, an underground water intake license is necessary for this purpose.

A reserve reservoir will be arranged on the territory supplying the camp units with water by gravity.

The waste waters will be collected in the sewage system on the camp territory and discharged via a common collector from the camp area.

The waste waters will be polluted with organic substances and therefore will need biological treatment. A technically relatively simple premise, a septic is to be provided to treat the waste waters. A septic is a premise, where the mechanical and biological treatment of waste waters and sludge mineralization take place at the same time. After the septic, the waste water will be disinfected and discharged into the surface water facility or environment (dry gorges etc.). The proposed site for camps is located far from the r. Mtkvari and discharge could be arranged in



dry gorge. However, the Construction Consultant will agree discharge mode with MoE and develop, if requested by Moe, the normative document “Admissible Maximum Discharges into the Surface Water Bodies”.

A waste container for domestic waste will be placed on the camp territory. The waste will be removed from the camp site under the agreement concluded with local services.

The requirements of the following normative documents must be considered when arranging the unit:

- Georgian Law “On water”;
- Georgian Law “On ore deposits”
- Georgian Law “On permits and licensing”
- Decree No. 745 of the Minister of Environment Protection and Natural Resources of Georgia of November 13, 2008 “On the technical environmental regulation”
- Construction Regulation Standards Building Code (MTS 07.01-09) - “Water supply and sewerage outer networks and premises”
- Construction Regulation Standards Building Code 2.1.4. 000 – 00 “Drinking water and water-supply of settled areas”
- Construction Regulation Standards Building Code 2.04.01–85 “Internal water pipeline and sewerage norms”
- Construction Regulation Standards Building Code 3.0.01–85 “Internal sanitary-technical systems”
- Construction Norm 496–77 “Temporal instruction to design the surface waste water treatment plants”.

### **Vehicle Fleet Depot**

The fleet includes a car park and repair boxes for construction techniques.

The tanks to collect the broken-down car parts will be placed on the territory of the repair boxes, in particular the metal boxes for oily parts, reservoirs for amortized tires and other polyethylene or rubber parts; the given remains will be removed from the territory under the agreement with local services. Plastic reservoirs will be placed for used oils and other oil product residues, and the contractor will be made responsible for their removal from the territory and rendering them harmless.

In order to avoid the expected risk of pollution of the soil or water reservoirs with oil products, the territory of the fleet will be flattened and a storm water collection system will be provided.

There is a risk of the storm waters pollution with suspended materials and oil products and therefore, the oil products retaining unit for the collected storm waters will be provided.

The amount of storm waters is calculated by the following formula:

$$Q=10 \times F \times H \times K$$

where Q is the volume of storm water, m<sup>3</sup>/day (m<sup>3</sup>/year)

F is the area of the territory, ha

H is the amount of precipitations, mm and is taken from the existing literary sources

K is the coefficient, which depends on the type of the cover.

According to the volume of storm waters, the treatment plant calculations will be made.

When building the unit, the requirements of the following normative documents must be taken into account:

- Georgian Law “On water”
- Building Norm 496-77 “Temporal instruction to design the surface waste water treatment plants”
- SNiP 2.11.04.–85 – “Underground reservoirs for oil, oil products and liquid air”
- Decree No. 1-1/2935 of the Minister of Economic Development of Georgia of December 8, 2008 “On gas filling stations and approving the rules of safety of gas filling complexes”.

### **Selection of territories**

In order to ensure the efficient work organization, the sites for the camps are to be selected carefully.

The selection of the location and size of a camp is the contractor's prerogative and responsibility, but the interaction between the construction staff and the environment and local population must be considered.



sur. 8.6 Proposed Camp Site



**Waste Management Plan for Construction Camp is given in annex 6. Here below we provide brief summary.**

The following categories of waste are expected during object exploitation:

- Household waste;
- Office waste (paper, cartridges, bulbs, etc.);
- Packaging (wood, paper, etc.);
- Oil contaminated clothes, filters, absorption pillows;
- Oil contaminated soil;
- Polymer waste;
- Medical waste.

The amount of household waste produced during plant functioning is connected with the staff number. According to the preliminary data, up to 200 people shall be employed. Following the accepted norm, 0.70 m<sup>3</sup> of household waste is produced per employee annually. Proceeding from the above, the amount of household waste per year will be: 0.70 X 200 = 140 m<sup>3</sup>. The installation of closed containers is planned for household waste at the object. The removal of this waste and disposal at the grounds will be conducted on the basis of the contract with the municipal cleaning service.

Oil contaminated mass as well as other hazardous waste shall be temporarily allocated within the plant in accordance with environmental and hygienic requirements and proceeding from the collection passed to the organization with appropriate environmental impact permit for further processing/disposal/treatment.

Wooden packaging material shall be passed to the local population for further re-use.

**The management of waste produced at the object (classification, inventory, segregation, collection, storage, passing and transportation) and monitoring shall be conducted in accordance with the principles, procedures and rules described in Annex 7**

#### **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 with the Technical Regulations.

### **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 (fueling 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 Center 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.

### **8.2 Monitoring and enforcement**

#### *Institutional Framework for EMP Implementation*

223. 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 supervisor<sup>14</sup> 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**

224. 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.

225. Technical supervisor 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.

226. 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**

227. 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**

---

<sup>14</sup>Technical supervisor is part of the consulting service for construction management to be hired by MDF (CMC)



228. 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**

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

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.

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

##### Mitigation Measures to be Implemented During the Construction Phase

Impacts	Sites	Mitigation Measures/Costs	Timeframe	Responsibility for Implementation	Responsibility for Monitoring
<p>Destruction of natural landscape (relief, soil cover, vegetation, eco-systems, habitats and wildlife) in the Right-of-Way occupied by the highway.</p> <p>Activities: land clearance, topsoil stripping and excavations</p>	<p>Whole alignment of road to be widened</p>	<p>Pre-entry survey for preventing damage to fauna will be conducted prior to start up of land clearance (inspection of bat living sites; inspection of nests in RoW)</p> <p>Sticks will be installed in pits and trenches for escaping small mammals.</p> <p>Proper top-soil storage practice, as described below, will be applied and stored topsoil will be used for reinstatement and landscaping;</p> <p>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 1:1</p>	<p>prior to start up of land clearance</p> <p>Excavation period</p> <p>From land clearance – till reinstatement</p> <p>Develop planting plan before construction start up. implement before completion</p>	<p>Constructing Contractor</p>	<p>MDF CMC</p> <p>Inspectorate of MoE</p>
<p>Destruction of natural landscape (relief, soil cover, vegetation, eco-systems, habitats and wildlife) on the access roads, in the <b>borrow pit</b> sites, <b>waste dumps</b>, <b>construction camps</b> and <b>equipment yards</b>.</p>	<p>Camp site;</p> <p>Quarry sites; (e.g. mtkvari floodplain).</p> <p>Waste dumps, construction camps and equipment yards.</p>	<p>Pre-entry survey will be conducted for preventing damage to flora and fauna;</p> <p>In case of unavoidable impact on rare or protected species of flora, replanting program will be planned and executed;</p> <p>Sticks will be installed in pits and trenches for</p>	<p>prior to start up of land clearance</p> <p>Excavation period</p> <p>From land</p>	<p>Constructing company.</p>	<p>MDF CMC</p> <p>Inspectorate of MoE</p>

		escaping small mammals	clearance – till reinstatement After completion of civil works		
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 drains.	Along the whole section of the road	Proper top-soil storage practice, as described below, will be applied and stored topsoil will be used for reinstatement and landscaping;  Landscaping plan will be developed and implemented;  Permanent and temporary anti-erosion measures will be implemented according to the Detailed Design (temporary drainage, biomatting 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. - Protection of drainage channels with berms, straw or fabric barriers. - Installation of sedimentation basins 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.	Construction period	Constructing Contractor	MDF CMC  Inspectorate of MoE
Increased 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	<b>Mitigation strategy:</b> 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	Whole alignment: the	The Contractor shall	Construction	Constructing	MDF



improper storage and handling  Earthworks will impact the fertile top soils that are enriched with nutrients required for plant growth or agricultural development	sections of road;	<ul style="list-style-type: none"> <li>- 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 1:2</li> <li>- Spread the topsoil to maintain the physico-chemical and biological activity of the soil. The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites</li> <li>- Topsoil stockpiles will be monitored and should any adverse conditions be identified corrective actions will include: <ul style="list-style-type: none"> <li>• Anaerobic conditions - turning the stockpile or creating ventilation holes through the stockpile;</li> <li>• Erosion - temporary protective silt fencing will be erected;</li> </ul> </li> </ul>	period: from starting topsoil stripping and ending with reinstatement;	Contractor	Inspectorate of MoE
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;  <b>Rivers – Mtkvari Km 0 - 1</b> ,	<ul style="list-style-type: none"> <li>- The Contractor shall</li> <li>- Prepare spill control procedures and submit the plan for RD approval.</li> <li>- Train the relevant construction personnel in handling of fuels and spill control procedures.</li> <li>- Store dangerous goods in banded 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 <ul style="list-style-type: none"> <li>• within 100m from the banks of r Mtkvari or other streams</li> <li>• within 500m from any residential areas, cultural or archaeological sites</li> <li>• </li> </ul> </li> <li>- All refueling 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 refueling operations. Ground water and surface water pollution risk will be reduced or eliminated in</li> </ul>	Construction period	Constructing Contractor	MDF CMC Inspectorate of MoE

Construction waste generation alongside the RoW	Construction sites	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 Refueling will always be carried out with the correct equipment (i.e. nozzles of the appropriate size), and only by suitably trained and experienced Refueling Operators.	Mobilization stage	Constructing Contractor	MDF CMC
<ul style="list-style-type: none"> <li>- excess soil and rock, demolished structures, packaging materials etc.)</li> <li>- Concrete and metal constructions</li> </ul>		<p>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.</p> <p>This is proposed actin. In more general terms: Assess and, if required, develop spoil and rock disposal plan</p> <p>Use spoil and excess rocks for construction of embankments and dike with riprap revetment.</p> <p>Provide for disposal facilities agreed with local municipalities;</p> <p>Allow local communities to utilize any excess rock, which may be left following reuse.</p> <p>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.</p> <p>Demolished metal constructions should be disposed as a scrap.</p> <p>The personnel involved in the handling of</p>	Construction period	Constructing Contractor	Inspectorate of MoE
			Mobilization		

		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.	phase and Construction period		
Emission from Construction Vehicles & Equipments causing air pollution	the whole alignment	<ul style="list-style-type: none"> <li>- Emission levels of all construction vehicles &amp; equipment will conform to Georgian emission standards.</li> <li>- Any crushing &amp; concrete plants will be away from populated areas.</li> <li>- Adherence to engine maintenance schedules and standards &amp; repair</li> <li>- All vehicles and plants shall be maintained so that their emissions do not cause nuisance to workers or local people.</li> <li>- 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.</li> <li>- 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).</li> </ul>	Construction period	Constructing Contractor	MDF CMC
Dust generation from construction sites, material stockpiles and access roads.  Dust is a nuisance in the environment causing health impacts for workers and local	The whole alignment	<ul style="list-style-type: none"> <li>- All precautions to be taken to reduce dust level emissions from batching plants &amp; portable crushers with spraying of water and containment measures.</li> <li>- During dry conditions material delivery vehicles and haul vehicles carrying sand and fill material will be covered with</li> </ul>	Construction period	Constructing Contractor	MDF CMC



population;		<p>tarpaulin. The construction site and any local roads will be watered as appropriate.</p> <ul style="list-style-type: none"> <li>- Protective equipment to be provided to workers as necessary e.g. at quarries, stone crushers.</li> <li>- Use of defined haul routes and reductions in vehicle speed where required with appropriate traffic management planning</li> <li>- Sheetting of construction materials and storage piles; and</li> </ul>			
Noise pollution from vehicle operation during construction in populated areas traversed by the highway, notably metropolitan areas or densely settled rural areas. Local noise.	The whole alignment	<p>Install and maintain mufflers on equipment.</p> <p>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.</p> <p>Prohibit night works near the settlements</p> <p><b>Protection of infrastructure.</b></p> <p>Implement the individual relocation/reconstruction plan and design as agreed with the owners of infrastructure within the frames of Detailed Design.</p> <p>Replace the affected infrastructure elements</p> <ul style="list-style-type: none"> <li>• Relocation of overhead power lines within the right of way of the construction site;</li> <li>• Relocation of gas pipeline</li> </ul> <p>Permanent monitoring during construction. Full reinstatement in case of damage.</p> <p>Remove all created pools till spring-time.</p> <p>Reinstate relief and landscape.</p>	Construction period	Constructing Contractor	MDF CMC
Infrastructure. The main infrastructure element that could be affected are: 1. power lines 2. Gas mainline and local supply pipelines 3. Optical fiber cable		<p>Prohibit night works near the settlements</p> <p><b>Protection of infrastructure.</b></p> <p>Implement the individual relocation/reconstruction plan and design as agreed with the owners of infrastructure within the frames of Detailed Design.</p> <p>Replace the affected infrastructure elements</p> <ul style="list-style-type: none"> <li>• Relocation of overhead power lines within the right of way of the construction site;</li> <li>• Relocation of gas pipeline</li> </ul> <p>Permanent monitoring during construction. Full reinstatement in case of damage.</p>	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,	whole alignment	<p>Remove all created pools till spring-time.</p> <p>Reinstate relief and landscape.</p>	Construction period	Constructing Contractor	MDF CMC

quarries, etc. suited to mosquito breeding and other disease vectors.					
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; See points 11 - 13	Construction period	Constructing Contractor	MDF
Impacts on archaeological sites and remnants	Whole alignment	Permanent monitoring during land clearance and excavation activities.  Stoppage and suspension of construction activities in case of archaeological findings. Completion of required archaeological works before restarting construction activities. Conservation of remnants.	Before start of construction;  Construction period	Archaeologist from MoCM  Constructing Contractor	MDF CMC  Archaeologist from MoCM
Biological recontamination during earthworks near pest-holes of soil infections (e.g. anthrax);	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.	Whole alignment	Provide in design for proper markers and safety signs on roads, including lights. Instruct the drivers	Construction period	Constructing Contractor	MDF CMC
<b>Final Reinstatement and Long-term Anti-erosion Measures</b>	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
<b>Tree cutting and Offset tree planting program.</b>	Sensitive zones	Offset tree planting program should be agreed with the MoE and Rustavi Municipality. Special agreement is required with the Georgian Orthodox Church in relation with trees to be cutted at the border of the Krtsanisi Park. Offset mitigation program will include measures on	Develop before construction start up. Implement before	Constructing Contractor	MDF CMC

			completion		
	replanting of trees in the park zone and further improvement of the park ecology. We propose to apply tree planting ratio 1:10 for felled red data tree species and ratio 1:2 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				
<p>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 (see WB Environmental Sourcebook: 'Hazardous Materials Management' section), injuries or loss of life (see 'Public Health and Safety section)</p> <p>Accidents due to construction related vehicles and heavy machinery or traffic interference with construction activities.</p>	The whole alignment	<ul style="list-style-type: none"> <li>- Provide in design for proper markers and safety signs on roads, including lights.</li> <li>- Instruct the drivers</li> <li>- Design and implement safety measures and an emergency plan to contain damages from accidental spills.</li> <li>- Designate special routes for hazardous materials transport.</li> <li>- Regulation of construction transport in terms of traffic interference.</li> <li>- Prohibition of toxic waste transport through ecologically sensitive areas and densely populated areas.</li> </ul>		Constructing Contractor	MDF CMC
<p><b>Quarrying Sites</b> Taking of Borrow and Quarry Materials for construction of embankments for road, bridge approaches with potential for loss and degradation of land; Potential impact of the increased quarrying activities on ichthyofauna, groundwater and landscape</p>	presumably, r.Mtkvari floodplain	<p>IEE proposes to use licensed quarries located in the vicinity to the project road (see chapter 2)</p> <p>In more general terms: Quarry and borrow pit materials will be obtained from existing operating sites with proper licenses &amp; environmental clearances. Control of validity of licenses. (The license is given with description of exploration limits and reinstatement commitments).</p> <p>In case of need for opening new borrow areas, all required licenses will be obtained from the Ministry of Energy and Natural</p>	Construction period	Constructing Contractor	MDF CMC  Inspectorate of MoE



			Resources;  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.  Contract only licensed supplier having all required environmental permits.  In case if the Constructing Contractor takes decision to install and operate its own plant, specific EIA should be prepared and Environmental Impact Permit obtained	Construction period	Constructing Contractor	MDF CMC	
<b>Concrete plants.</b>	Plant site		- Proper waste management (see appendix XX Waste Management Procedures for Camps) - Apply regulations relevant to the camp sites and referred in p. 8.1.1.13 - Arrange accommodation of personnel in villages. In case if large camp will be constructed for the workers accommodation, organize sewerage according standards. - Pollution prevention measures: proper organization of fueling, waste management; Proper storage of topsoil - Reinstatement of topsoil and vegetation cover;	Construction period	Constructing Contractor	MDF CMC	Inspectorate of MoE
<b>Construction Camp, equipment yard and Vehicle Fleet Site</b>  The potential impacts related to the construction and operation of the camp could be summarized as follows: - Clearance of vegetation cover during camp construction - Potential damage of topsoil - Contamination related to fuel storage and fuelling operations - Sewerage related contamination - Waste related contamination	camp site						

## Operation Phase

Impacts	Sites	Mitigation Measures	Timeframe	Responsibility for Implementation	Responsibility for Monitoring and Enforcement
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. <b>Character of impact:</b> long-term. Change of relief, drainage patterns, land clearance, may cause gradual but stable intensification of erosion	Whole alignment	<p>Mitigation strategy: long-term – remediation; reinstatement of relief and landscape; Installation of long-term drainage systems and anti-erosion structures.</p> <ul style="list-style-type: none"> <li>- reinstatement of relief, soil and vegetation cover</li> <li>- installation of long-term drainage system and permanent monitoring.;</li> <li>- Installation of sedimentation basins, seeding or planting of erodible surfaces as soon as possible</li> <li>- Increase number of drain outlets.</li> <li>- Place drain outlets so as to avoid cascade effect.</li> <li>- Line receiving surface with stones, concrete.</li> <li>- Long-term monitoring and maintenance</li> </ul>	Construction stage;  Maintenance after completion of construction	Constructing contractor  RDMRDI in long-term perspective	RDMRDI  Inspectorate of MoE
Landscape disfiguration by embankments and deep cuts, fills and quarries. Marred landscape (scars from rod cuts, induced	New cut sites.	<ul style="list-style-type: none"> <li>- Maintenance and and/or restoration of roadside vegetation</li> <li>- Use an architectural design to 'blend with the</li> </ul>	Construction stage;  Maintenance	Constructing contractor  RDMRDI in long-term perspective	RDMRDI  Inspectorate of MoE

landslides and slumps etc.).		landscape. - Replant disfigured surfaces.	after completion of construction		
Increased sediment in streams affected by erosion at construction sites and fresh road cuts, fills and waste dumps. declined water quality due to increased sedimentation. <b>Character of impact:</b> long-term. Change of relief, drainage patterns, land clearance, may cause gradual but stabile intensification of erosion	near the river Mtkvari	<b>Mitigation strategy:</b> 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
Soil and water contamination by oil, grease, fuel and paint alongside the highway	whole alignment	Install oil traps at large bridges (Gubistskali, Cherekha, Ochopa); Facilitate installation of standard refueling stations and repair shops along the highway	after completion of construction	RDMRDI in long-term perspective	RDMRDI
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	RDMRDI
Air pollution from vehicle operation, in populated areas traversed by the highway, notably metropolitan areas or densely settled rural areas. Local dust.	whole alignment  Most critical starting point near Gulua bridge and end point close to	- Monitoring of air quality and traffic related emissions (including inspection of vehicle emissions) - Development of policy and regulations limiting		MoE  Constructing contractor  RDMRDI in long-term perspective	MoE



	Phonichala;	<p>traffic related emissions (regulations on fuel quality etc.)</p> <ul style="list-style-type: none"> <li>- Require adherence to engine maintenance schedules and standards (or use alternative fuels) to reduce air pollution.</li> <li>- Plant trees along the roadside to screen and smoothen emission impacts on the close located villages</li> </ul>			
Noise pollution from vehicle operation, in populated areas traversed by the highway, notably metropolitan areas or densely settled rural areas.	<p>whole alignment</p> <p>Most critical starting point near Gulua bridge and end point close to Phonichala;</p>	<ul style="list-style-type: none"> <li>- High solid walls – wooden or stone/brick</li> <li>- Require adherence to engine maintenance schedules and standards</li> <li>- Plant trees along the roadside to screen and smoothen noise impacts on the close located villages</li> <li>- Enhance public transportation and traffic management capability.</li> </ul>		Maintenance contractor	MoE
Roadside litter.	whole alignment	<ul style="list-style-type: none"> <li>- Provide for disposal facilities.</li> <li>- Encourage anti-littering laws and regulations.</li> </ul>		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	whole alignment	Establishment of plant and animal sanitation service and related checkpoints	Operation period	Customs Services, Sanitary Supervision of the	RDMRDI

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		MLHSP", the "National Service for the Foodstuffs and Veterinary Protection" of the Ministry of 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	RDMRDI	RDMRDI
Obstruction of access roads	Crossing of local roads	Proper Design of interchanges have mitigated this potential impact. See in RAP	Design stage	Constructing Contractor	RDMRDI

## 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	Periodic (average once per month);	Assure compliance with HSE requirements.  Good condition of standard construction	Minimal Included in supervision contracts	MDF CMC  MoE



			limitations and other provisions of EMP.) noise measuring device	Only in case of complaints	machinery and limiting the works near settlements to the site-related works is the only way for efficient noise control		
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
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	Observation	During material delivery and periodically during construction	Assure pollution abatement; Assure compliance with,	Minimal Included in supervision contracts	Constructing Contractor; MDF; CMC

		areas; wash down areas		(average 1/week), especially during precipitation (rain/snow/ etc).	construction standards, environmental norms and EMP provisions;	n contracts	
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
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

Whole construction period.	biological recontamination during earthworks near pest-holes of soil infections (e.g. anthrax);	All earthwork sites	Observation	Permanent/daily	Assure health protection	Minimal Included in supervision contracts	Construction Field officer; MDF CMC
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	Veterinary Department of the NSFSVPP 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



Whole construction period.	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. Legislations and regulations of Georgia**

230. 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.

231. 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.

232. 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**

233. **(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.

### **234. (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.

235. 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**

236. 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 March 1, 2012 (50 days later after the disclosure of the draft document and announcement regarding the planned meeting).



Series of separate meetings with affected stakeholders have been conducted in relation with the Land Acquisition and Resettlement Plan. The minutes of all these meetings are provided in Annex 7. Disclosure of the LARP and further public consultation meeting will be organized by MDF.

**Protocol of public review of the EIA Report of construction of Tbilisi-Ponichala and Ponichala-Rustavi sections of Tbilisi-Rustavi speedway**

**Tbilisi**

**March 1, 2012**

On March 1, 2012, the public review of the EIA Report of construction of Tbilisi-Ponichala and Ponichala-Rustavi sections of Tbilisi-Rustavi speedway took place at the office of Georgian Municipal Development Fund.

The meeting was attended by the:

Representatives of the Georgian Municipal Development Fund:

- Nikoloz Soselia, a specialist of the environmental protection analysis and resettlement department;
- David Baindurashvili, a specialist of the environmental protection analysis and resettlement department;

a representative of the environmental protection consultation fund “World Experience for Georgia”

- Irakli Kaviladze;

a representative of the Spatial Planning and Building Policy Department of the Ministry of Economics and Sustainable Development of Georgia:

- Amiran Katsadze;

as well as NGOs and consulting companies:

- Tamar Gugushvili - Aarhus Centre in Georgia;
- Irine Svanidze - Association “Green Alternative”
- Gia Gvilava - International Transparency Georgia
- Gia Aladashvili - ‘Information Centre of Social Reforms’
- Zurab Gvelesiani - International Transparency Georgia
- David Khidesheli - MAMISONI LTD.
- Valeri Gelashvili - ENGURI 2006 LTD.
- R. Sharashenidze - VBR LTD.
- Ilgar Abdulaev - AKKORD.

and citizens:

- Tamar Bakhurauli;
- Manon Bokuchava and
- Shakro Mirotadze.

The meeting was opened by the specialist of the environmental protection analysis and resettlement department Nikoloz Soselia, who informed the attendees of the aim of the meeting and presented Mr. Irakli Kaviladze, a representative of the environmental protection consultation fund “World Experience for Georgia” to the public, who informed the public about the EIA and relevant report within the limits of the Project. He noted that when drafting the EIA report, the background status of the physical and social environment of the design section of Tbilisi-Rustavi road was studied. In particular, they studied the atmospheric air quality (pollution with harmful substances, natural radiation background, noise propagation), surface water quality, biodiversity, cultural heritage, social aspects, etc.

By considering the works to be accomplished, the types of expected possible impact, degree of impact and needed mitigation measures were specified. The plans of environmental management and monitoring of the planned actions are drafted.

At last, the reporter communicated about the conclusions developed in the EIA process, in particular:

- The Project has a significant positive social-economic impact evidenced by the guaranteed increased traffic flows (local and transit) at the expense of the road with due carrying capacity;
- The general negative effect of the Project is associated with the impact on private lands and associated property and businesses, loss of property or income along the road for the physical and legal entities. Resettlement and compensations will be accomplished in line with the World Bank rules and Georgian legislation. This question will be discussed in the Resettlement Action Plan in detail, which will be published after the relevant document is drafted. During the document drafting, the consultations with the impacted people will be organized individually and in groups.
- The implementation of the Project is not related to any particular environmental impact and is mostly related to the common factors of construction works, like dust, emissions, noise, etc. what can be mitigated by observing the building rules and taking the measures under the management plan.
- The Project is accomplished on strongly transformed urban landscapes with no protected areas, habitats of ecological value or eco-systems in the impact area. Despite this, a certain amount of trees will be felled (mostly the along-road green space plants). The possibility of damage to individual trees of any red-listed or endangered species (e.g. chestnut trees, Plot's Elm, Aldar pine) is not excluded. After the corridor demarcation by the building contractor, the proper cadastre studies in the corridor, marking the trees to be felled, avoiding the protected species as to the extent possible and accomplishing the procedures envisaged by the Law of Removing the Red-Listed Species from the Natural Environment are necessary. A concrete plan of compensatory planting must be developed and agreed with Tbilisi and Rustavi Municipalities and Ministry of Environmental Protection.

After the presentation of the EIA report, the participants of the public review were given the possibility to express their own opinions and notes. A question about the reasons for the resettlement problem not considered under the EIA report and the population subject to resettlement not informed about the public review was put.

In this respect, I. Kaviladze explained to the author of the question that in connection to the resettlement issues a study is underway and a resettlement action plan is being developed, which will thoroughly cover all questions of resettlement. As soon as the said plan is ready, it will be subject to the public review in line with the requirements of the Asian Bank of Development.

The information about the questions and proposal during the public review is given in the annex.

Information about the questions and proposal during the public review of the EIA Report of construction of Tbilisi-Ponichala and Ponichala-Rustavi sections of Tbilisi-Rustavi speedway			
No.	Authors of questions, notes and proposals	Question	Answer
1	T. Gugushvili (Aarhus Centre) and I. Svanidze (Green Alternative)	Notes and proposal during the public review The EIA report was not acceptable for them	<p>The EIA report was not acceptable for them, as it did not cover the resettlement issues. As they explained, EIA should cover the analysis of environmental, social and all expected impacts.</p> <p>The EIA is drafted in the format consistent with the legislation of Georgia (Provision of the Environmental Protection Agency of October 4, 2011) and ADB requirements for Category B projects (Initial Environmental Examination). The resettlement issues are discussed in chapter 5.3 of the document to the extent due for the documents of the given format. In particular, chapter 5.3 (pp. 84-89) considers the abstract of the main data known at the developing stage of EIA report, description of number of the affected legal and physical entities, kind of impact, type of business objects and brief description of the ADB resettlement principles.</p> <p>In addition, the explanation about a separate resettlement action plan being developed to be published and publicly reviewed was made. During the document drafting, the consultations with the impacted people will be organized individually and in groups.</p> <p>At present, the resettlement action plan is being completed and it will be published at the end of March of 2012, and its public review will be presumably held at the beginning of April.</p> <p>As for the EIA/IEE document, its final version shall include the accurate information delivered by the team drafting the resettlement plan as soon as at the current stage.</p> <p>Explanation: the information about the planned review was published in the newspaper "The 24 hour" and on Aarhus Centre and MDF web-sites.</p> <p>The modern EIA principles mean considering the meaningful alternatives and not nominal execution of procedures.</p> <p>The EIA contains the explanation about the Project of Tbilisi-Rustavi being divided into 3 sub-sections. At present, an intense study of the alternatives of 2nd section of the road is underway, covering the complex analysis of the existing road corridor and other possible</p>
2	T. Gugushvili (Aarhus Centre) and I. Svanidze (Green Alternative)	Where the information about the public review was published?	
3	I. Svanidze (Green Alternative)	The presented EIAs do not consider the alternatives of each section or expected environmental impact assessment, and there is no due calculation or validation.	



			<p>routes (including environmental and resettlement aspects). The analysis of alternative routes is paid much attention to in the feasibility study of the mentioned section and EIA.</p> <p>As for section 1 (Tbilisi-Ponichala) and section 3 (Ponichala-Rustavi), the Project envisages the modernization and extension of the existing road and not the construction of new sections, and different routes were not meaningful alternatives for the presented Project.</p> <p>The maps shown in the EIA, clearly show that Tbilisi-Ponichala sections follows a narrow corridor between the river Mtkvari (on its left) and steep mountain slope of Shavnavaba ridge (on its right), where there is no either need, or possibility of any alternative route, as in general, the impact on the environmental and social environment is within the norms or even less than along other sections of the speedway. There is no topographical limitation for the section Ponichala-Rustavi, but any rerouting is associated with penetrating the settled areas thus increasing the impact of resettlement. This is so clearly seen on the maps that needs no special quantitative evaluation. As a rule, the extension of the existing road is a priori associated with less impact on the natural and social environment, and the alternatives are sought in the exceptional case when there are significant limitations (technical or social/environmental). Such an exception is the 2<sup>nd</sup> section of the road (Ponichala section), where the existing road is limited by densely populated areas from its both sides. Despite the above-mentioned and clarity of the issue, the revised IEE of Ponichala-Rustavi section includes expended chapter related to Analysis of Alternatives with additional graphic and quantitative information making the unpromising nature of the search for alternative routes even clearer.</p>
4	I. Svanidze (Green Alternative)	<p>The report says that people not having their plots legalized are not eligible for compensation. This is against the ADB requirements. The report also says that each family will receive 200 GEL for transportation. Which criteria were used to fix this amount?</p>	<p>The report does not contain any information implying that those not having their plots legalized are not eligible for compensation, but on the contrary, paragraph 5.3 clearly says that:</p> <ul style="list-style-type: none"> <li>• All affected people, notwithstanding their legal rights to property, will receive the different aid to reserve their pre-project means of subsistence and living standards.</li> <li>• Those using the land illegally, will not receive the compensation for the loss of land, but they will be compensated for the loss of any other property owned by them on the given land. They will also receive the allowances</li> </ul>

		<p>to maintain or improve their living standards.</p> <p>In addition, we would like to explain that in line with the ADB requirements, those occupying the land illegally (with no registered property right of the land or any other legal basis to recognize the land property right with its further registration), will not receive the compensation for land, but will receive the compensation for the loss of harvest, buildings and premises, trees or source of income.</p> <p><b>The version of the Project presented for the public review (para. 5.3, p. 87. Compensation Legibility) says that:</b></p> <p>"The families subject to physical resettlement will receive monetary aid of 200 Gel per family for transportation (to hire vehicle to transport the family belongings) and monetary aid to restore their income source for 3 months, as the aid rendered to establish oneself at a new location). This amount is the subsistence minimum for 3 months amounting to 1.112 Gel per family."</p> <p>The said citation was taken from the "Land Acquisition and Resettlement Framework" (2008) agreed and approved with the ADB by MDF. After disclosure of the first draft of IEE in January 2012 and prior to the start up of preparation of the LARP, the mentioned frame documents were updated. The revised document formulates the said clause as follows:</p> <p>"The families subject to physical resettlement will receive additional aid to cover their cost of transportation (311 Gel) and 3 months' subsistence minimum (3x311 Gel) to help alleviate the transitional period." The final, corrected version of EIA will accordingly contain this clause.</p> <p>At the same time, we would like to once again underline that this clause talks about the additional aid only, while the compensation itself covers the compensation of the lost property (land, buildings and premises, trees) and one-year harvest of annual plants at the full replacement cost.</p> <p>At last, the cited fragment is taken from the part of paragraph 5.3 of IEE considering the eligibility principles approved for the Project and not about real impacts. The list of real impacts does not include the description of the physical resettlement of the affected families from their place of residence. No such case takes place</p>
--	--	--

			under the Project. The final EIA variants are attached by the brochures during the consultations with the population as an annex, which gives a detailed description of resettlement principles agreed with the ADB.
5		A question about the waste was put: Where and how will the waste generated during the work be placed? The EIA states that the waste will be placed at the municipal landfills, while in the current situation it is impossible to meet this requirement, as the existing landfill is already overfilled. In addition, the place and manner of placement of the hazardous waste must be indicated.	The EIA says that there is a decision to close up lagluj landfill and its conservation project will be developed. The conservation needs the covering of the closed landfill with inert fill material. The IEE recommends using the inert material generated during the construction of Tbilisi-Rustavi road for this purpose. This has two kinds of environmental benefits: on the one hand, the need for transporting the inert material from borrow pits to cover the landfill will be reduced and on the other hand, the problem of placement of the construction inert materials will be simply settled.  As for the other waste, including domestic, hazardous, etc., according to EIA, such waste shall be placed by licensed companies under the agreement.
6		Was there any study undertaken to specify the need for this road? If yes, what is its effect?	Yes, the study was accomplished at the early stage of the project development and early stages of the project preparation.
7		Why this meeting is not attended by the representatives of the organization working on the resettlement issues?	The meeting is attended by the representatives authorized to give answers about the resettlement issues (Mr. D. Baindurashvili (MDF) and Mr. Avto Okromchedlishvili (independent auditor)). At the same time, we would like to underline that the consultations about the resettlement issues with the affected people takes place in another format (individually and in focus groups), while the review of the resettlement action plan documents will be organized at a separate meeting at the end of March/at the beginning of April.



## **10. GRIEVANCE REDRESS MECHANISM**

237. 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.

238. MDF has overall responsibility for project implementation and environmental compliance. The administrative bodies responsible for environmental protection are MoE and Tbilisi City and regional (Rustavi, Gardabani) municipal offices (gameoba). 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.

239. 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:

Region#	
Title of the Project	
Name, Last name	
Contact Information  Please indicate the preferable means of communication (Mail, Telephone, E-mail)	<input type="checkbox"/> Mail: Please indicate the postal address: _____ _____ _____ <input type="checkbox"/> Telephone: _____ <input type="checkbox"/> E-mail: _____ _____
The language desirable for the communication	<input type="checkbox"/> Georgian <input type="checkbox"/> English <input type="checkbox"/> Russian
Describe the grievance/claim: What is the complaint about? What is the claim?	
Date of Negotiation:	Resolution of Negotiation:
What is the basis of your claim?	

<b>Proposed Addresses for Submission of Grievance Forms</b>
<p>1. Ministry of Environment of Georgia 6 Gulua str. 0114 Tbilisi, Georgia Fax: 2727237/ Phone: 2727200</p> <p>2. Municipal Development Fund of Georgia Address: 150 David Agmashenebeli ave. 0112 Tbilisi, Georgia (99532) 2437001; 2437002; 2437003; 2437004 Fax: (99532)2437077 E-mail: <a href="mailto:mdf@mdf.org.ge">mdf@mdf.org.ge</a> Contac person: Nino Patarashvili (environmental and social specialist); e-mail: <a href="mailto:npatarashvili@mdf.org.ge">npatarashvili@mdf.org.ge</a>; Phone:</p> <p>3. Asian Development Bank/ Resident Office in Georgia 39A Chavchavadze Ave. 0162 Tbilisi, Georgia Tel: +995 322 250619 to 21 Fax: +995 322 250622. Contact Person: Tea Papuashvili e-mail: <a href="mailto:tpapuashvili@adb.org">tpapuashvili@adb.org</a> Phone: 2250619</p>



## **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 legalizable 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 losses, 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.

# Municipal Development Fund of Georgia



## Initial Environmental Examination

### *Section-3: Phonichala - Rustavi*

### **Volume-2 (ANEXES)**

Engineering, Procurement, Construction Management and Supervision of  
the Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge  
(Azerbaijani Border) Road

Contract No: SUTIP/C/QCBS-3

*Funded by*  
**Asian Development Bank**  
**Loan: 2655-GEO**

Prepared by: Foundation WEG  
Prepared for:  
DOHWA Ltd / TRANSPROJECT Ltd  
Ministry of Regional Development and Infrastructure

**GEORGIA**

**2012**



**Korea**



**Georgia**



**Georgia**



## **Table of Contents**

- Annex 1.** Legal framework and administration structure of environmental management in Georgia
- Annex 2.** Report of the Environmental Protection Agency on background pollution
- Annex 3.** Modeling the impact of vehicle exhaust on air quality
- Annex 4.** List of licensed borrow pits near the design area and copies of the licenses
- Annex 5.** Procedures to remove the plant species on the Red List of Georgia from the natural environment and change the category of the forest fund ground
- Annex 6.** Waste management plan for construction camps
- Annex 7.** Protocols of Public Consultation Meetings
- Annex 8.** List of references
- Annex 9.** List of the EIA authors

## **LIST OF ACRONYMS**

### **CURRENCY EQUIVALENTS**

#### **ABBREVIATIONS**

ADB	Asian Development Bank
EIA	Environmental Impact Assessment
EIP	Environmental Impact Permits
EMP	Environmental Management Plan
HWL	High Water Level
IEE	Initial Environmental Examination
L/A	Loan Agreement
LARP	Land Acquisition and Resettlement Plan
MAC	Maximum Admissible Concentration
MDF	Municipal Development Fund
MoCM	Ministry of Culture and Monuments Protection
MoE	Ministry of Environment Protection
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**

ha	hectare
km	kilometre
km <sup>2</sup>	square kilometres
litres/s	litres per second
m	metre
m <sup>2</sup>	square metre
m <sup>3</sup> /s	cubic metre per second
m <sup>3</sup>	cubic metre
mm	millimetre
s	seconds

## LEGAL FRAMEWORK AND ADMINISTRATIVE STRUCTURE IN GEORGIA

### 1.1 ADMINISTRATIVE STRUCTURE

Recent changes in the administrative structure, adopted by the Decrees No 132 and 133 of the Government of Georgia dated 16.03.2011, resulted in redistribution of responsibilities between the Ministry of Environmental Protection and Natural Resources (MoEPNR) and the Ministry of Energy and are reflected in current titles of the mentioned ministries. The MoEPNR is renamed as the Ministry of Environmental Protection (MoE) and the Ministry of Energy is now titled as the Ministry of Energy and Natural Resources.

#### **Ministry of Environment Protection (MoE) and Ministry of Energy and Natural Resources.**

The MoE is still considered as a leading ministry responsible developing the environmental policy of the government. The MoE 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	<ul style="list-style-type: none"> <li>- Carrying out Ecological Expertise and issuing Environmental permits</li> <li>- Post EIA monitoring of compliance with the conditions of Environmental Permit</li> </ul>
Department of Environmental Policy and International Relations	<ul style="list-style-type: none"> <li>- Development of the State Policy and State Environmental Programs</li> </ul>
Department of Integrated Management of Environment	<ul style="list-style-type: none"> <li>- Ambient air and water protection strategy</li> <li>- Consent on the Reports of "Inventory of Stationary Sources of Emissions" and "Norms of Maximally Admissible Emissions"</li> <li>- Consent on the Report on "Norms of Maximally Admissible Discharges"</li> <li>- Consent on the technical regulations for Water Intake from the Surface Water Objects</li> <li>- Waste Management</li> <li>- Hazardous Substance Management</li> <li>- Climate change control</li> <li>- Environmental Standards and Norms</li> </ul>
Biodiversity Protection Department	<ul style="list-style-type: none"> <li>- Biodiversity protection policy and programs</li> </ul>



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

The Ministry of Energy and Natural Resources has at present overall responsibility for managing natural resources and radiation safety.

The Department of Natural Resources is managing following environmental issues:

- Issuance of licenses on exploration of natural resources. 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

Environmental Inspection of the MoENR is responsible for:

- 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 still in charge of issuing Environmental Impact Permits. At the same time, as it could be seen from the above schemes, both agencies – MoE and MoENR are sharing responsibilities for the post EIA monitoring, although the efficient monitoring system still needs to be developed. MoENR is responsible for issuing licenses for quarries and borrow pits.

The Ministry of Environmental protection defines and evaluates real and possible risk of impact on natural environment during implementation of different types of activities. Accordingly the Ministry has been assigned as responsible body for making decision on granting permission to the proponent on implementation of projects, which require Environmental Impact Assessment (EIA). Granting procedures slightly differ for different type of projects.

For the projects, which do not require Construction Permit, the Environmental permit is being issued by the Moe on the ground of State Ecological Examination. State Ecological Examination is carried out by Moe upon official submission of Environmental Impact Assessment (EIA) prepared by project developers.

For projects requiring Construction Permit, no special permit is issued by MoE (according to “One window principle”, only one permit shall be issued for each activity). The Construction Permit is issued by the Ministry of Economic Development of Georgia, but the issuance of the Permit is subject to the consent of the MoE in a form of Conclusion of Ecological Expertise, as well as the Ministry of Culture (Center of Archaeological Studies, Department of Monuments protection). Consent of the MoE in such cases should be issued according to the same

procedures (EIA, public consultations; SEE etc.) as for issuing Environmental Permit. The Ministry of Economic Development as an administrative body issuing a permit ensures the involvement of the MoE as a different administrative body in the administrative proceedings initiated for the purpose of permit issuance, in accordance with Georgia's Law on Licenses and Permits.

project screening (definition of the project category and necessity for preparation of EIA) and scoping (definition of set of environmental issues and Terms of Reference) is carried out by the project implementing agency and its consultants (in this case RDMRDI and its consultants). Scoping and screening do not represent mandatory procedures according to Georgian legislature although review of scoping/screening outcomes and agreement of the Ministry of Environment Protection is considered a desired practice.

As a rule, EIA permitting conditions contains requirement for informing MoE regarding fulfillment of the EIA permit conditions. This basically means giving information regarding implementation of Environmental Management and Monitoring Plans.

**Ministry of Economic and Sustainable Development.** The projects related to construction or reconstruction of the highways of international significance are classified as the projects of Special Importance. MoESD is responsible for carrying out the review of technical documentation (including conclusion of an independent experts) and issuing Permits on Construction for such 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 Economic Development of Georgia

MoESD is issuing licenses for operations of quarries, needed for highway construction activities.

**The Roads Department of the Ministry of Regional Development and Infrastructure of Georgia (RDMRDI).** 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, loans, grants and other financial sources.

### **RDMRDI Responsibilities and Capacity Analysis**

Within the frames of the programs and projects, where the RDMRDI is appointed by the Government as implementing agency, the RDMRDI is responsible for the procurement of design and EIA studies, as well as works on construction and rehabilitation of roads of international and national significance, and is responsible for ensuring compliance with the Georgian legislation and environmental and social requirements of the relevant donor organizations. Control of implementation of the EMP is direct responsibility of the RDMRDI.

The RDMRDI should have adequate capacity to ensure due consideration of environmental and social concerns at the stages of strategic planning, project development, design and environmental studies and construction or reconstruction activities.

The RDMRDI is supposed to review the EIAs and EMPs related to the RDMRDI projects and perform monitoring of compliance of the contractor's performance with the approved EMPs, EIAs, environmental standards and other environmental commitments of the contractor.

Internal resource of the RDMRDI is estimated to be sufficient for execution of project administration and overall environmental management. For the environmental monitoring of concrete projects, including the Zestafoni-Samtredia Highway project, RDMRDI shall procure technical and environmental supervision services.

#### **Other Responsible Governmental Institutions:**

**The Ministry of Culture and Protection of Monuments.** The ministry 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 (NSFSVPP).** NSFSVPP is responsible for implementation of complex sanitary protection measures in case of identification of 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 Constructing Contactor (field environmental officer) and RDMRDI field officer.

[Note: Governmental institutions responsible for technical supervision and compliance with the design documentation and construction standards are described in Design Documentation and are not subject for EIA or EMPs]

## **1.2 LEGAL FRAMEWORK**

### **1.2.1 Framework Legislation**

The basic legal document is “**The Constitution of Georgia**”, which was adopted in 1995. While the Constitution of Georgia does not directly address environmental matters, it does lay down the legal framework that guarantees environmental protection and public access to information with regard to environmental conditions.

Article 37, Part 3 states that “any person has the right to live in a healthy environment, use the natural and cultural environment. Any person is obliged to take care of the natural and cultural environment.” Article 37, Part 5 states that “an individual has the right to obtain full, unbiased and timely information regarding his working and living environment.”

Article 41, Part 1 states that “a citizen of Georgia is entitled to access information on such citizen as well as official documents available in State Institutions provided it does not contain confidential information of state, professional or commercial importance, in accordance with the applicable legal rules.

Legislative execution of constitutional requirements in the sphere of environmental protection is implemented through framework Georgian “Law on Environmental Protection” (1996, as amended) and the set of specific laws developed on its basis. The framework law regulates the legal relationship between the bodies of the state authority and the physical persons or legal entities (without distinction-legal form) in the scope of environmental protection and in the use of



nature on all Georgia's territory including its territorial waters, airspace, continental shelf and special economic zone. The law deals with education and scientific research in the scope of environment, environmental management aspects, economic levers, licensing, standards, EIA and related issues. Considers different aspects on protection of ecosystems, protected areas, issues of global and regional management, protection of ozone layer, biodiversity, protection of Black Sea and international cooperation aspects. In particular, the law addresses broad spectrum of issues, like environmental management, environmental education and awareness building, licenses and permits, fines and enforcement, environmental impact assessment, which should be further regulated by specific laws. According to the requirements set forth in the framework law, numerous laws and normative–legal documents were adopted to regulate specific environmental issues in Georgia. Further below the environmental regulations most relevant to the project – and first of all, to the permitting process - are described.

### **1.2.2 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 more details the EIA process and required content of the EIA document is described in the **Regulation on EIA issued by the MoE dated March 16, 2009**.

**The Law on Licenses and Permits** was adopted by Parliament of Georgia, on June 24, 2005. The 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 on Ecological Examination** have been published on 14.12.2007 and entered in force on 01.01.2008. These new laws integrate all the amendments introduced in legislation of Georgia during recent years.

#### **The Law of Georgia 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.

Under the “activities” subject to the ecological examination the law considers construction of new or upgrading of existing facilities imposing change of technology and operational conditions for the projects and activities included into the list. The routine maintenance works in relation with the same facilities do not require ecological examination and 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 is 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 responsibilities of parties. According to the practice, the screening of project proposals and the preliminary assessment of their environmental impact and proposed mitigation measures (scoping) are being carried out by the project proponent in consultation with the MoE.

#### Public Consultation Procedures.

The 6<sup>th</sup> clause of the law of Georgia on the Environmental Impact Permit provides detailed requirements and procedures for conducting public consultations and established timeframes for information disclosure and discussion, namely:

According to article 6 , developer is obliged to carry out public discussion of the EIA before its submission to an administrative body responsible for issuing a permit (in case of activity requiring construction permit before initiating stage 2 procedure for construction permit issuance).

A developer is obliged to disclose (publish) the draft EIA document and publish information regarding details for the planned public discussion. Information is subject to publication in the central periodical as well as in the printing organ existing within the administrative territory of the same rayon (if such exists) where an activity is planned. Information (advertisement) shall contain the following information:

- The objectives, title and location of the planned activity;
- The location where interested individuals may obtain the activity related documents (including the EIA report);
- Deadline for the submission of their opinions;
- The place and time of public discussion.

A developer is entitled:

- To submit a hard copy and an electronic version of the Environmental Impact Assessment to administrative body issuing a permit within a week from the date of the publication;
- To receive and consider within 50 days from the date of publication from citizens written comments and suggestions;
- Hold a public discussion on a planned activity not earlier than 50days and not later than 60 days from the publication of an advertisement;
- To ensure invitation to public discussion of the representatives of respective local administration and governmental agencies representatives; the Ministry and the Ministry of Economic and Sustainable Development and other interested administrative bodies.

Discussion shall be held publicly and any citizen has a right to attend it. Public discussion shall be held in the administrative center of the rayon where an activity is planned.

According to the article 7 of the law, during 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, if required. If the comments and proposals of stakeholders are not accepted a letter of explanation should be sent to the authors. 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.

#### Procedure of Official Submission of EIA to MoE

Article 8 of the Law specifies the documents to submit to receive a permit:

- (1) An operator, in order to receive a permit, shall submit a written statement to the Ministry. A statement to receive a permit is submitted, considered and processed under the rule established by the 'Law of Georgia on Licenses and Permits'.
- (2) An operator is obliged, in addition to the information specified by the 'Law of Georgia on Licenses and Permits', to submit the following documents:
  - (a) An EIA 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 stationary 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

The article 9 of the law describes the procedures of issuing the Environmental Impact Permit. The same issue is 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 decision on issuing Permit within the 20 days after submission of request on permit by the project proponent.
2. MoE, in accordance with the law on Ecological Examination, ensures expertise of the submitted documentation and issuance of Conclusion on Ecological Examination. The Permit (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 as of March 16, 2009.**

The requirements related to EIA studies and the EIA report are set forth in the Regulation on EIA issued by MoE in March 2009.

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

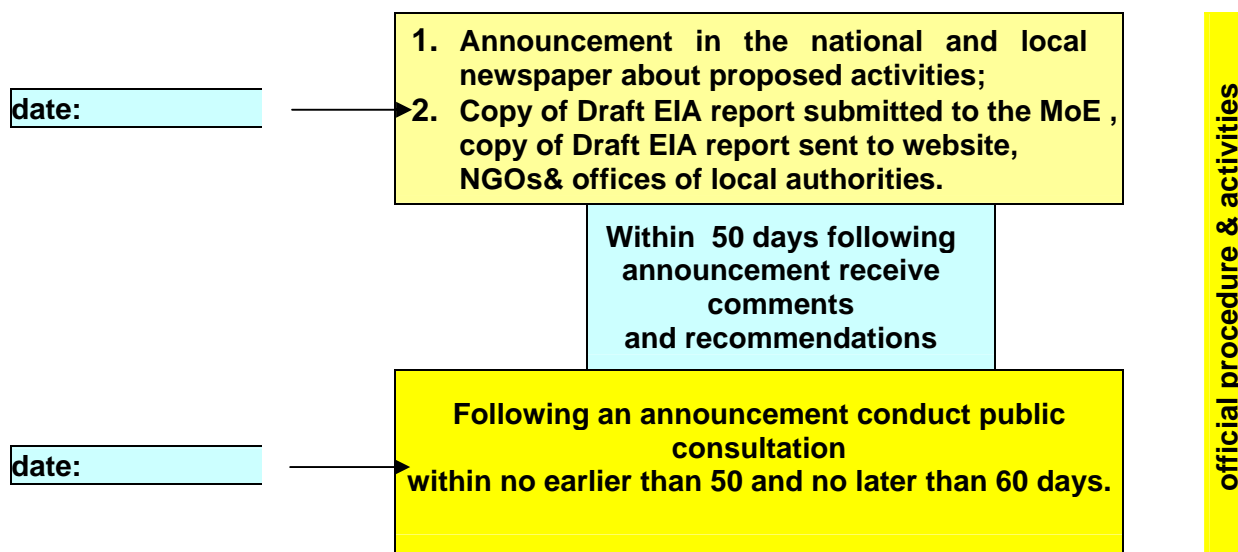
#### **Article 5. Content of the environmental impact assessment**

The Environmental impact assessment report should include the following information:

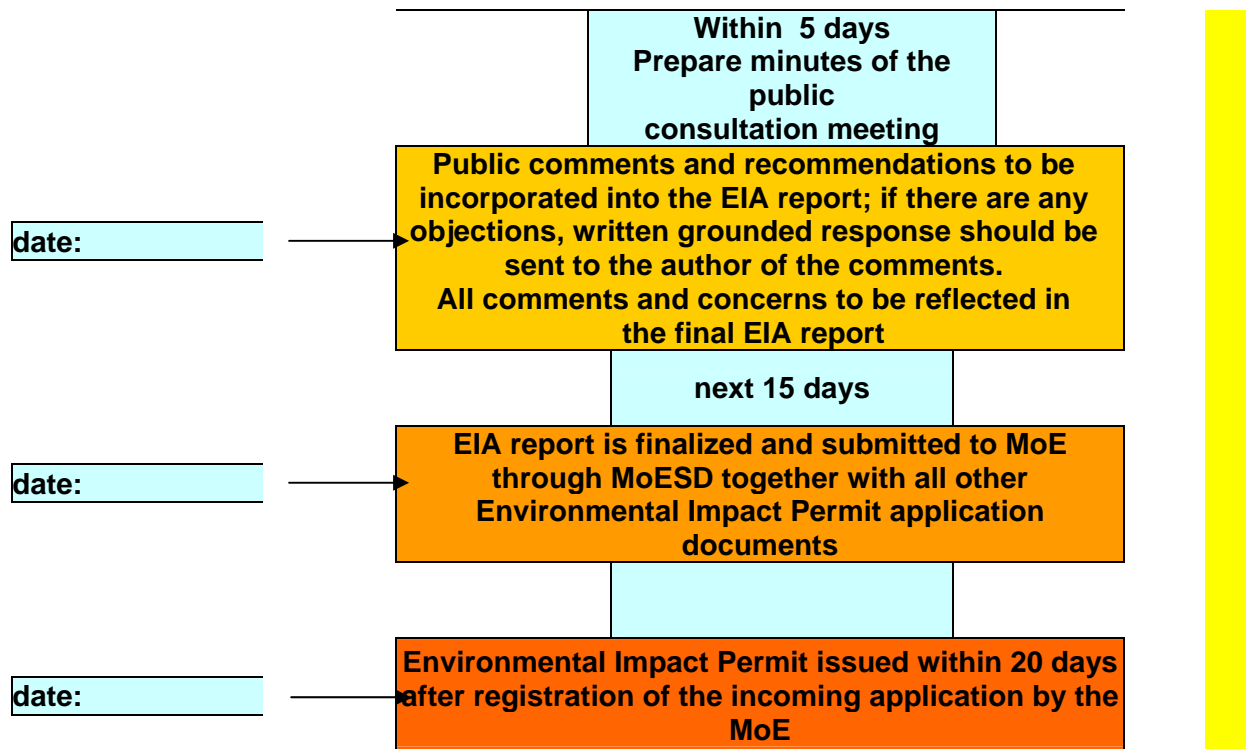
- (a) Analysis of the existing state of the environment;
- (b) Identifying the sources, kinds and objects of impact caused by the activity;
- (c) Forecast of the changes of quantitative and qualitative characteristics of the environment;
- (d) Determining the probability of emergency situations due to 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.

### **Disclosure and Environmental Impact Permit Procedure**







### 1.2.3 Other Environmental Laws

The Law on Environmental Inspectorate has been adopted in 04.05.2010. This Law has been abolished in 2011, however its provisions are in force until the relevant authorized bodies will issue new regulations. This Law authorized Environmental Inspectorate to conduct post EIA monitoring on compliance with the Conditions of Environmental Permit and conditions of licenses for exploration of natural resources. For the moment of issuing of this law, the Environmental Inspectorate was under the MoE. Currently, as we have described in p. 2.1, the Environmental Inspectorate has been moved to the Ministry of Energy and Natural Resources. Department of Permits of MoE and Environmental Inspectorate of MoENR are sharing responsibilities for the post EIA monitoring.

**Waste Management.** The following acts of the Ministry of Labour, Health and Social Protection of Georgia define the waste management rules to be met during the road rehabilitation projects:

The act on “Approval of the rules of collection, storage and neutralization of the wastes of preventive treatment establishments” 16 August of 2001, 300 (“Georgian Legislative Messenger” N90 24/08/2001);

The act on “Approval of arrangement of polygon/grounds for disposal of solid household wastes and adoption of sanitary rules and norms” 24 February, #36 (Georgian Legislative Messenger #17, 07.03.03);

The “Georgian Law on Ambient Air Protection” was put into effect from 1 January 2000.

The scope of the “Georgian law on Ambient Air Protection” is to protect ambient air on the whole territory of Georgia from harmful human impact. This law does not govern the field of air protection in work places. Main competences of governmental authorities in the field of ambient air protection (a) Development of environmental monitoring (observation) system; (b) Development and implementation of common policies and strategies; and (c) Development of integrated ambient air pollution control.

Types of harmful human impact include:

- introduction of pollutants into the ambient air;
- radioactive impact on ambient air;
- ambient air pollution with micro-organisms and microbial toxins;
- physical impact of noise, vibration, electromagnetic field etc on ambient air.

Types of ambient air pollution are specified:

- emission of pollutants into the ambient air from stationary pollution source;
- emission of pollutants into the ambient air from mobile sources of pollution;
- emission of pollutants into the ambient air from non-point sources of pollution;
- emission of pollutants into the ambient air from small-scale sources of pollution.

According to the Article 29<sup>1</sup>, the inventory on emissions of air pollutants from stationary pollution sources is obligatory for physical and legal entities. The special inventory report is to be prepared for 5 years for each source of the atmospheric air pollution and each type of a harmful substance.

At preparing the EIA project, a full inventory on emissions (in case of existence) is to be carried out and maximum permissible concentrations or temporarily agreed permissible concentrations of the emitted harmful substances for stationary pollution sites are to be set. Maximum permissible concentration is an amount of permitted emissions of air pollutants from stationary pollution sources. Temporarily agreed permission concentrations can be approved for five years (maximum) without prolongation. The Maximum permissible concentration of the emitted harmful substances for stationary pollution sites is approved for 5 years for each source of the atmospheric air pollution and each type of a harmful substance.

Registration of emissions from stationary pollution sources comprises:

- self-monitoring of emissions;
- state emission registration system.

Self-monitoring of emission of pollutants from stationary pollution sources means that economical actor (operator) shall conduct adequate self-monitoring of pollutant emissions from stationary pollution sources. It includes:

- emission measurements (assessment)
- registration of emissions
- reporting of emissions

State emission registration system is a system of compilation, processing and analysis of emission reporting documentation. The Ministry of Environment Protection and Natural Resources of Georgia conducts state registration of emissions.

**The Law of Minerals of 1996** provides provisions for the mineral resource exploration and management and establishes the requirement to obtain a license according to the procedures

established under this law. The Law on Licensing and Permits (June 25, 2005) establishes the most recent regulations for licensing. According to the current legislation all quarries and borrow pits require to obtain a license.

**The Wildlife Law of 1996** mandates the MoE to regulate wildlife use and protection on the whole territory of the country. The law empowers the MoE to issue hunting permits and licenses, declare hunting areas, control poaching etc. Potential poaching by the workers should be controlled also during construction works, especially in such a sensitive ecological areas as Borjomi-Bakuriani.

### **Forestry Code of Georgia (1999, including effective amendments)**

The Forestry Code of Georgia regulates the legal relations connected to looking after, protection, restoration and application of the forest fund and its resources. The aims of the Forestry Code of Georgia are as follows:

Looking after, protection and rehabilitation of forests aiming at conserving and improving their climatic, water-regulating, protective, cultural, health, medicinal and other mineral wealth, conservation and protection of original natural and cultural environment and its individual components, including the vegetation cover and fauna, bio-diversity, landscape, cultural and natural monuments in the forests, rare and endangered plant species and others and regulation of their interaction in the benefit of the future generation.

Article 38 of the Forestry Code establishes the modes of protection of the state forest fund:

- (1) Aiming at protecting the present state of the state economic forest fund and its biodiversity, originality of intact forests and relict, endemic and other valuable plant species, the general or special mode of protection of the state economic forest fund has been introduced by considering the priority functionality, historical, cultural and other values of the forest
- (2) The mode of protection of the protected territories of Georgia is defined under the Georgian Law 'On the system of protected territories'.

**Article 41** defines the modes of protection to be used for different categories of the state economic forest funds:

- (1) The mode of special protection applies to the resort and green zones of the state economic forest fund, as well as flood-plain forests and forest sub-alpine zone.
- (2) The mode of general protection applies to the soil conservation and water-regulation forests under the rule provided by Article 42 of the present Code.

**Article 39** specifies the special limitations to certain types of activity defined by the special mode of protection:

- (1) The following activities are prohibited in the state economic forests and lands where a special mode of protection is applied:
  - (a) Cutting of a principal use;
  - (b) Activities of the first and second categories as defined by the Law of Georgia 'On environmental permits', except the programs for rehabilitation of the protected areas and founding the hunting firms (02.03.2001 749).

### **Law of Georgia 'On the system of the protected areas' (1996)**

The Law defines the categories of 'protected areas' and specifies the frames of activities admissible in the given areas. The permitted actions are defined by considering the designation of the areas and in accordance with the management plans and provisions of the international

conventions and agreements to which Georgia is a party. As a general requirement, the following activities are prohibited in the protected areas:

- (a) Disturbance or any other changes of the natural ecosystems
- (b) Demolition (destroy), arrest, disturbance, damage (invalidation) of any natural resource with the purpose of its exploitation or any other purpose
- (c) Damage of the natural ecosystems or species by reason of the environmental pollution
- (d) Bringing and breeding foreign or exotic species of living organisms
- (e) Bringing explosives or toxic materials to the area.

According to the above-mentioned Management Plan, all kinds of economic and entrepreneurship activities are admissible in the support zone provided they do not hamper the functioning of the protected areas.

### **Law of Georgia 'On the Red List and Red Book' (2003)**

The Law regulates the legal relations in the field of developing the Red List and Red Book, protecting and using the endangered species, except the legal issues of the international trade with endangered wild animals and wild plants, which within the limits of the jurisdiction of Georgia are regulated by virtue of the Convention 'On the international trade with the endangered species of wild fauna and flora' concluded on March 3 of 1973 in the city of Washington.

According to Article 10 of the Law, any activity, including hunting, fishing, extraction, cutting down and hay-mowing, except particular cases envisaged by the present Law, Law of Georgia 'On animal life' and legislation of Georgia, which may result in the reduction in number of the endangered species, deterioration of the breeding area or living conditions, is prohibited.

Possible harmful effect of anthropogenization on the endangered species should be taken into account when issuing the permit on environmental impact during the ecological expertise.

The Red List of Georgia was approved by the **Presidential Decree No. 303 'On approving the Red List of Georgia' (May 2, 2006)**

The water supply and wastewater system rehabilitation project is to be accomplished within the resort zone and accordingly, the Law of Georgia 'On Tourism and resort' and Law of Georgia 'On the zones of sanitary protection of resorts and resort areas' should be considered.

**Decree No. 538;** There is a chance that the project activity may cause harm to the environment, which will be impossible to mitigate even through planning and realizing the preventive measures. The rules to estimate and compensate for the environmental damage have been developed for such cases under the Decree No. 538 'On approving the methods to estimate the environmental damage' of the Minister of Environmental Protection and Natural Resources of Georgia adopted on July 5, 2006. Below we site the clauses, which may be useful to estimate the damage within the limits of the project.

**Article 2.** The rule to estimate the damage caused by the harmful anthropogenic action on the atmospheric air

**Article 3.** The rule to estimate the environmental damage caused by the soil pollution

**Article 4.** The rule to estimate the environmental damage caused by the soil degradation

**Article 5.** The rule to estimate the environmental damage caused by illegal action with forest resources



**Article 6.** The rule to estimate the environmental damage caused by damaging the green plantations in the capital of Georgia, other cities and towns, regional centers and settlements

**Article 7.** The rule to estimate the damage caused by damaging the fish reserve and other biological forms

**Article 8.** The rule to estimate the damage caused by illegal acquisition of the animal life objects

**Article 9.** The rule to estimate the environmental damage during the fossil exploitation

**Article 10.** The rule to estimate the environmental damage caused by the pollution of water resources.

### **The Law of Georgia on Soil Protection**

(1994. Amended in 1997, 2002)

The aim of the Law is to protect the soil from the contamination and sets the limits for the hazardous substances concentration in it.

The regulates the usage of fertile soils for non agricultural purposes and strictly prohibits to undertake any kind of activity without removal of the fertile soil layer and makes compulsory to reinstate sites after open mining. It regulates uncontrolled pasturing of animals and protects forest as a mean to maintain the soil in a favourable condition. Prohibits and regulates any kind of activity related to the storage of chemicals and hazardous substances could pollute or damage the soil properties.

### **The Law of Georgia on Water 1998 as amended**

This Act governs the legal relations: Between state authorities and natural and legal persons (regardless of the form of ownership and the legal-organizational status) in the sphere of water protection, study and use;

In the sphere of water protection, restoration and use on the land, in the continental shelf, territorial waters and in the special economic zone;

In the sphere of commercial water production and international trade in water;

Under the current law requirements no water discharge or abstraction license is required in case of discharge of the water the developer by Environmental Impact Permit might be required to submit Maximum Permissible Discharge Documents cululating the volumes of the discharge and impact on environment.

The '**Law of Georgia on Cultural Heritage**' was approved in May of 2007. Article 14 of the Law specifies the requirements for 'large-scale' construction works. According to this Article, a decision on career treatment and ore extraction on the whole territory of Georgia, as well as on construction of an object of a special importance as it may be defined under the legislation of Georgia, is made by a body designated by the legislation of Georgia based on the positive decision of the Ministry of Culture, Monument Protection and Sport of Georgia. The basis for the conclusion is the archeological research of the proper territory to be carried out by the entity wishing to accomplish the ground works. The entity wishing to do the ground works is obliged submit the Ministry the documentation about the archeological research of the territory in question. The preliminary research should include field-research and laboratory works. In case of identifying an archeological object on the territory to study, the conclusion of the archeological research should contain the following information: (a) a thorough field study of the archeological 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 archeological research.

## **Georgian Law on Regulation and Engineering Protection of Coasts of Sea, Water Reservoirs and Rivers of Georgia (27.12.2006, No. 4131)**

### **Article 9. Rules regulating the economic activity within the coast protection zone**

- (1) The body issuing a building permit within the zone of coast engineering protection is obliged to engage the Ministry in the permit issuing process as a concerned administrative body and send it proper documentation for the obligatory conclusion.
- (2) The construction project of buildings and premises within the zone of coast engineering protection should envisage the compensation amounts for the expected coastal damage.
- (3) Extraction of inert material within the zones of strict supervision of sea, water reservoir or river is prohibited, unless this is done for the purposes of coast-formation or control of streams.

### **1.2.4 International Commitments**

International cooperation is a dominant feature and driving force for environmental reforms in Georgia. Some of the International Treaties and Conventions Ratified or Signed by Georgia are provided in the list below.

#### **Short List of the Ratified or Signed Conventions**

N	Title	Year of ratification
1	Ramsar Convention on Wetlands	1996
2	United Nations Framework Convention on Climate Change (UNFCCC)	1994
3	Kyoto Protocol	1999
4	Basel Convention on the Control of Transboundary Movement of Hazardous Waste and Their Disposal	1999
5	Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention)	1999
6	United Nations Convention to Combat Desertification (UNCCD)	1999
7	Convention on Biological Diversity	1994
8	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	1996
9	The Vienna Convention for the Protection of the Ozone Layer	1995
10	Montreal Protocol on Substances that Deplete the Ozone Layer	1995
11	Convention on Long-range Transboundary Air Pollutants	1999
12	Stockholm Convention on Persistent Organic Pollutants	2006
13	Convention on the Conservation of European Wildlife and Natural habitats	2008
14	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2006

### **Aarhus Convention June, 1998**

The Aarhus Convention establishes a number of rights of the public (individuals and their associations) with regard to the environment. The Parties to the Convention are required to make the necessary provisions so that public authorities (at national, regional or local level) will contribute to these rights to become effective. The Convention provides for:

- the right of everyone to receive environmental information that is held by public authorities ("**access to environmental information**"). This can include information on the state of the environment, but also on policies or measures taken, or on the state of human health and safety where this can be affected by the state of the environment. Applicants are entitled to obtain this information within one month of the request and without having to say why they require it. In addition, public authorities are obliged, under the Convention, to actively disseminate environmental information in their possession;
- the right to participate in environmental decision-making. Arrangements are to be made by public authorities to enable the public affected and environmental non-governmental organisations to comment on, for example, proposals for projects affecting the environment, or plans and programmes relating to the environment, these comments to be taken into due account in decision-making, and information to be provided on the final decisions and the reasons for it ("**public participation in environmental decision-making**");
- the right to review procedures to challenge public decisions that have been made without respecting the two aforementioned rights or environmental law in general ("**access to justice**").

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 and of plant, animal, and microbial life to begin using biological resources in 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 recognised as holding an important reservoir of biodiversity and 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:

1. One out of 25 biologically richest and endangered land ecosystems (Conservation International);
2. One out of 200 vulnerable ecoregions (WWF);
3. One out of 221 endemic bird habitats (Bird Life International);
4. One of the World Agrobiodiversity Centres.

Georgia has implemented a number of measures on fulfilment of the guidelines defined by the International environmental treaties which is partly to, in particular:

- The country acceded the most important international treaties on biodiversity, such as Convention on Biological Diversity, Convention on Wetlands of International Importance, Especially as Waterfowl Habitat, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention) and its Agreements;
- A number of national legislative acts has been adopted in the field of conservation and sustainable use of biodiversity since 1996;
- Georgia conducted biodiversity assessment studies (National Biodiversity Assessment Program, UNEP, 1996);
- Strategy and Action Plan on conservation of Georgia's biological diversity was elaborated and approved (2005);

- With the financial support of the German Government and the Global Environment Facility (GEF), the Protected Areas - the Borjomi-Kharagauli and the Kolikhiti National Parks were established; with the support of the German Government, new protected areas are planned to be established on the Javakheti Plateau in southern Georgia;
- With the support of the Global Environment Facility (GEF), the Project on Development of Protected Areas in Georgia is being implemented. The aim of the project is to elaborate management plans for three protected areas in eastern Georgia (Lagodekhi, Vashlovani and Tusheti), to develop infrastructure necessary for their effective management and to strengthen the State Department for Protected Areas in terms of improving skills for protected areas management;
- With the financial support of the World Bank, the forestry development project is under implementation in Georgia to promote conservation and sustainable use of Georgian forests.

Though the development of protected areas is the major strategy for protection of biodiversity in Georgia, some other priority directions in this field have emerged:

- conservation – preservation of rare and endangered species in bio-reserves;
- creation of genetic fund of wild nature;
- sustainable use of renewable natural resources;
- reproduction – breeding of rare and endangered species and their introduction in the nature.

### **The Convention on the Conservation of Migratory Species of Wild Animals**

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range. It has been signed in 1979 in Bonn (Germany.) Georgia ratified the treaty in 2000 together with its three agreements:

- Agreement on “Protection of Populations of European Bats” (EUROBATS);
- Agreement on “Conservation of Cetaceans of the Mediterranean Sea, Black Sea and Contiguous Atlantic Area “ (ACCOBAMS );
- Agreement on “ Conservation of African-Eurasian Migratory Waterbirds” (AEWA).

Taking into account, that the Agreements have been initially designed as an instrument for facilitating the implementation of the CMS, the compliance with and enforcement of CMS in Georgia is mostly reflected in implementation of the Agreements.

## **1.2.5 Environmental Standards and Norms**

### **Environmental Quality Regulations and Standards**

Within the context of the water supply and water drainage project, the environmental quality standards and norms are of primary importance. They define the quality of drinking water, admissible levels of surface waters pollution and measures of their protection including the zones of sanitary protection. The mentioned standards are considered under a separate clause (Clause 2.1.4). The maximum admissible levels of atmospheric air pollution and noise are also of a certain importance to the stage of building. Noise and atmospheric air pollution pose be a certain problem during the building operations (mainly, as the building techniques emissions and welding emissions) and exploitation of the rehabilitated objects (e.g. in case of operation of diesel-generators).



In accordance with the 'Law on public health', the environmental qualitative norms are approved by Decrees of the Minister of Labor, Health and Social Security of Georgia (Decrees Nos. 297/N of 16.08.2001, including the changes made to it by further decrees of the Ministry Nos. 38/N of 02.24.2003, 251/N of 09.15.1006, 351/N of 12.17.2007).

**Ambient Air Quality Norms.** The provisions for the protection of ambient air against contamination and the values of Maximum Admissible Concentrations of the harmful substances in the ambient air in the vicinity of the settlements is provided in the Environmental Quality Norms approved by the Order #297N (16.08.2001) of the Ministry of Labour, Health and Social Protection (as amended by the Order No 38/n of the same Ministry of 24.02.2003). The quality of atmospheric air (pollution with hazardous matter) is also defined by the order of the Minister of Environment Protection and Natural Resources (#89, 23 October 2001) on approval of the rule for calculation of index of pollution of atmospheric air with hazardous pollution.

**Table 1.1 Maximum Admissible Concentration of Pollutants (MAC) in Ambient Air mg/m<sup>3</sup>**

N	Substance	N according to CAS	Formula	MAC (mg/m <sup>3</sup> )		Class of harmfulness
				Maximum fugitive	Average Daily	
1	2	3	4	5	6	8
6	Nitrogen (IV) Dioxide	10102-44-0	NO <sub>2</sub>	0.2	0.04	2
111	Sulfur Dioxide	9/5/7446	SO <sub>2</sub>	0.5	0.05	3
359	Carbone Oxide	630-08-0	CO	5	3	4
360	Soot (Carbone black)	1333-86-4	C	0.15	0.05	3

**Noise Standards.** The Georgian standards for noise control are approved by the Decree of the Minister for Health, Labour and Social Affairs (297n of August 16, 2001) on the 'Approval of Environmental Quality Standards', which specify the tolerable and maximum admissible levels of noise for different zones.

**Table 1.2. Georgian Noise Quality Standards in Residential Areas**

Time	Indicative Level La dBA	Maximum Admissible Level La max dBA
7am – 11 pm	55	70
11pm – 7am	45	60

## **ANNEX 2**

### **REPORT OF THE ENVIRONMENTAL PROTECTION AGENCY ON MEASUREMENTS OF BASELINE CONTAMINATION WITHIN THE PROJECT AREA**



# **Analysis Report**

**Considerations and interpretations of Test Report No. \_20(2011)**

**National Environmental Agency**

**Department of Environment Pollution Monitoring**

**Laboratory of Atmospheric Air, Water and Soil Analyses**

---

Floor 8, David Agmashenebeli Avenue 150, Tbilisi 0112, Georgia

## **Analysis Report No. ...20...**

**Numbers of registered samples:** 423, 424, 429, 430, 431

**Number of Protocol pages:** 9

**Client:** Non-entrepreneurial Entity WORLD EXPERIENCE FOR GEORGIA

**Client's address:** Apt. 3, Building 17, Block 7, Vazha-Pshavela Avenue, Tbilisi

**Tel:** (+99532) 599 16 22 21

**Fax:**

**ID No.:**

**E-mail:**

**Etiquettes provided by the Client:** # 1, # 2, # 3, # 4, # 5

**Sample description and identification (matrix, form):** Surface and ground water, atmospheric air, soil

**Used method/device:** Ion-chromatographic, spectrophotometric, atomic-absorption, titrimetric, membrane-filtration

**Sample receiving date:** CR: 12.12.2011.

**Date of analysis:** 12.12.2011 – 23.12.2011

**Date of issue:** 26.12.2011



Nos. 423, 424, 429, 431 (# 4, # 5, # 1, # 3)

### Surface water

#	Description	Maximum Permissible Concentration	Mtkvari Ortachala	Surface water at the entrance to Rustavi	From the gully along the route	Mtkvari (in the Patriarchate 's forest)
			N 41°40'31,6''	N 41°35'55,3''	N 41°36'17,0''	N 41°37'09,5''
			E <sub>O</sub> 44°50'10,0''	E <sub>O</sub> 44°56'30,4''	E <sub>O</sub> 44°56'15,7''	E <sub>O</sub> 44°56'24,0''
1	Turbulence, NTU		1.67	1.49	1.21	1.58
2	pH	6.5-8.5	8.211	8.123	8.141	8.603
3	Diluted oxygen, mg/l	4 – 6	8.15	8.07	8.02	8.45
4	Hydrocarbonates, mg/l		173.2	222.0	192.8	173.2
5	TDS, mg/l		257.0	778.0	1491.0	274.0
6	Total nitrogen, N, mg/l		2.772	2.804	7.858	2.479
7	Total phosphate, mg/l		0.266	0.387	0.859	0.135
8	Chlorides, mg/l	350	20.2	159.7	77.9	19.37
9	Oil products, mg/l	0.3	0.024	0.063	0.042	0.012

# 430 (# 2)

**Ground water**

<b>No.</b>	<b>Description</b>	<b>Maximum Permissible Concentration</b>	<b>Water from the territory of the Patriarchate</b>
	<b>Coordinates</b>		N 41 <sup>0</sup> 37'05,4'' E <sub>O</sub> 44 <sup>0</sup> 56'12,0''
<b>1</b>	pH		8.403
<b>2</b>	TDS, mg/l		599.0
<b>3</b>	Sulphates, mg/l	250	791.6
<b>4</b>	Chlorides, mg/l	250	48.8
<b>5</b>	Hydrocarbonates, mg/l		185.4
<b>6</b>	Sodium, mg/l	200	68.5
<b>7</b>	Calcium, mg/l	140	149.2
<b>8</b>	Magnesium, mg/l	85	31.4
<b>9</b>	Total coliforms, in 250 ml	Inadmissible	None detected

**Information about the concentration of polluting substances in the atmospheric air**  
**Non-entrepreneurial Entity WORLD EXPERIENCE FOR GEORGIA**

Date of measurement	№	Place of measurement	Site coordinates	t <sup>0</sup>	humidity, %	Concentration, mg/m <sup>3</sup>			
						Dust	CO	NO <sub>2</sub>	SO <sub>2</sub>
12.12.11.	№ 1	Ortachala (0,0km)	N 41°40'31,6'' E <sub>o</sub> 44°50'10,0''	2.6	26	0.176	2.36	0.113	<0.1
	№ 2	Ponichala (9,0km)	N 41°37'58,7'' E <sub>o</sub> 44°55'07,7''	3.0	32	0.098	1.42	0.076	<0.1
	№ 3	Rustavi highway (13,5km)	N 41°35'55,3'' E <sub>o</sub> 44°56'30,4''	3.2	30	0.072	0.98	0.046	<0.1
	№ 4	Entry to Rustavi (17,7km)	N 41°33'50,2'' E <sub>o</sub> 44°57'52,9''	3.6	34	0.104	1.66	0.082	<0.1
	<b>Maximum Permissible Concentration</b>					0.5	5.0	0,2	0,5

### Soil analysis results

#	Description	Ortachala (0,0km)	Ponichala (9,0km)	Rustavi highway (13,5km)	Entry to Rustavi (17,7km)
		N 41°30'31,6'' E <sub>O</sub> 44°50'10,0''	N 41°37'58,7'' E <sub>O</sub> 44°55'07,7''	N 41°35'54,3'' E <sub>O</sub> 44°56'30,4''	N 41°33'50,2'' E <sub>O</sub> 44°57'52,3''
<b>1</b>	Lead, Pb, mkg/g	73.4	15.4	42.33	18.2
<b>2</b>	Zinc, Zn, mkg/g	187.6	61.9	91.6	65.5
<b>3</b>	Cobalt, Co, mkg/g	15.71	12.76	12.69	12.5
<b>4</b>	Copper, Cu, mkg/g	153	81.8	98.6	90.9
<b>5</b>	Nickel, Ni, mkg/g	29.9	18.2	19.7	22.7



**Type of analysis:** A - accredited, N - Non-accredited, C - Pre-international accreditation period, subcontractual - accreditation, subcontractual - non-accreditation; used method: IC-ion chromatograph, UV/VIS-spectrophotometer, atomic-absorptive.

**Note:** The results of the analyses are disputable within 14 days of receiving the protocol.

---

Analysis Report drafted by:

**Elina Bakradze,**

---

Head of the

Laboratory of Atmospheric Air, Water and Soil Analyses

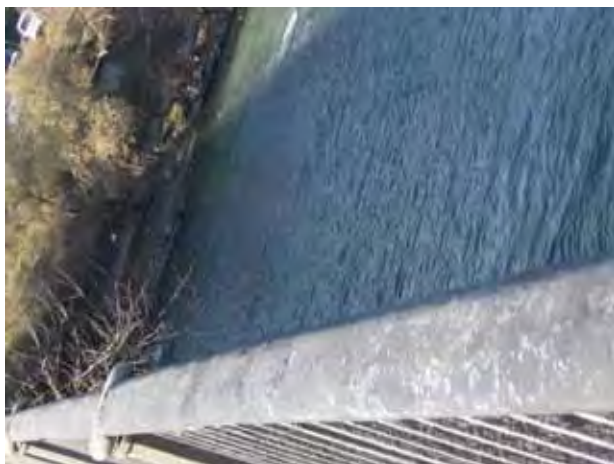
---

Protocol examined by:

**Gulchina Kuchava,** Head of Division

Analysis Report approved by:

**Marine Arabidze,** Head of Department





## **MODELLING OF TRAFFIC RELATED EMISSIONS**



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

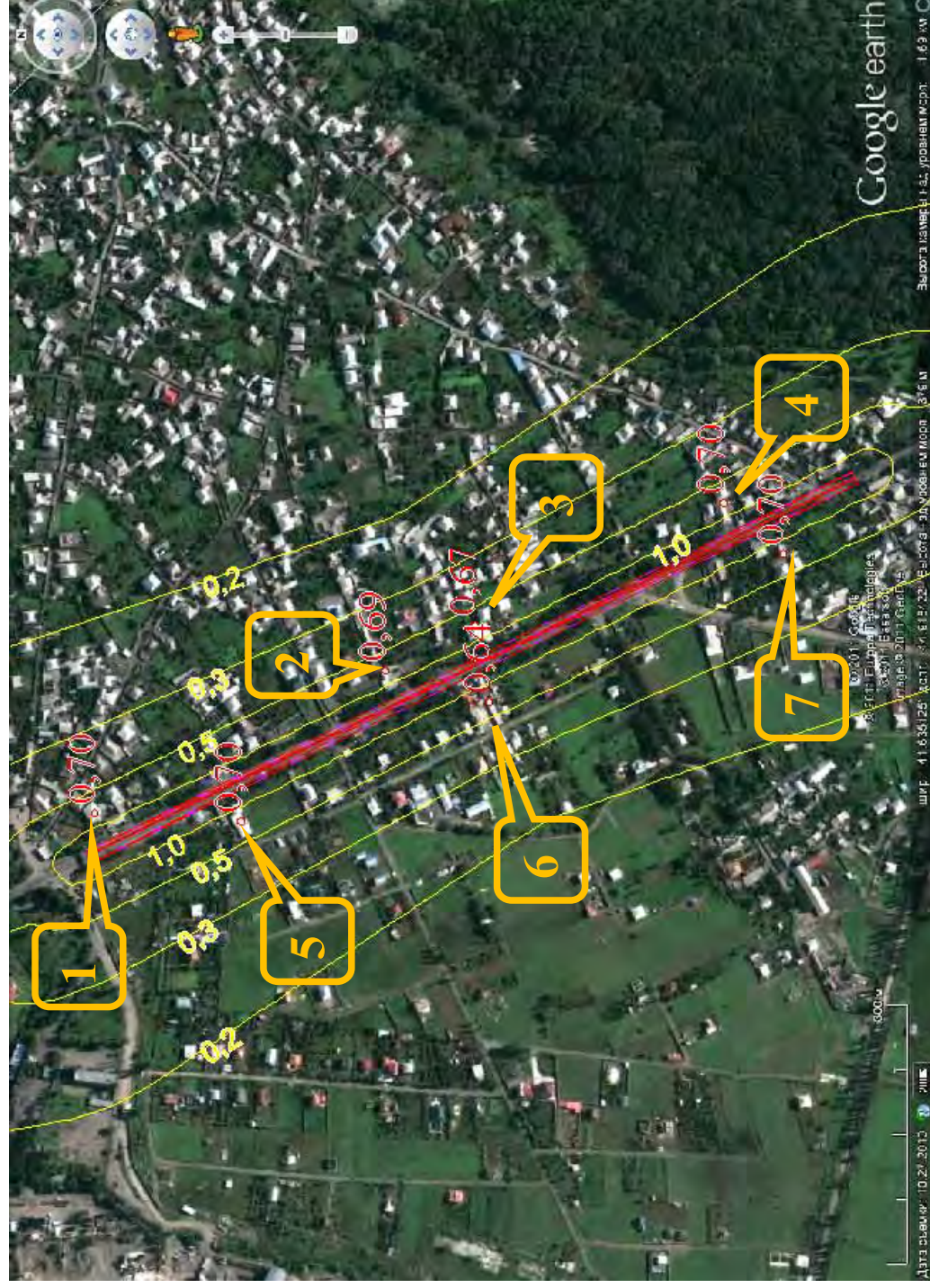
The hourly intensity of traffic within Tbilisi-Rustavi highway rehabilitation according to observation data in 2011 is characterized with the below parameters: cars - 507 units; minibuses - 201 units; autobuses - 21 units and trucks - 18 units; dispersions calculated from this data [1] are given in the form of a table in Appendix #1.

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; dispersions calculated from this data [1] are given in the form of a table in Appendix #2.

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.

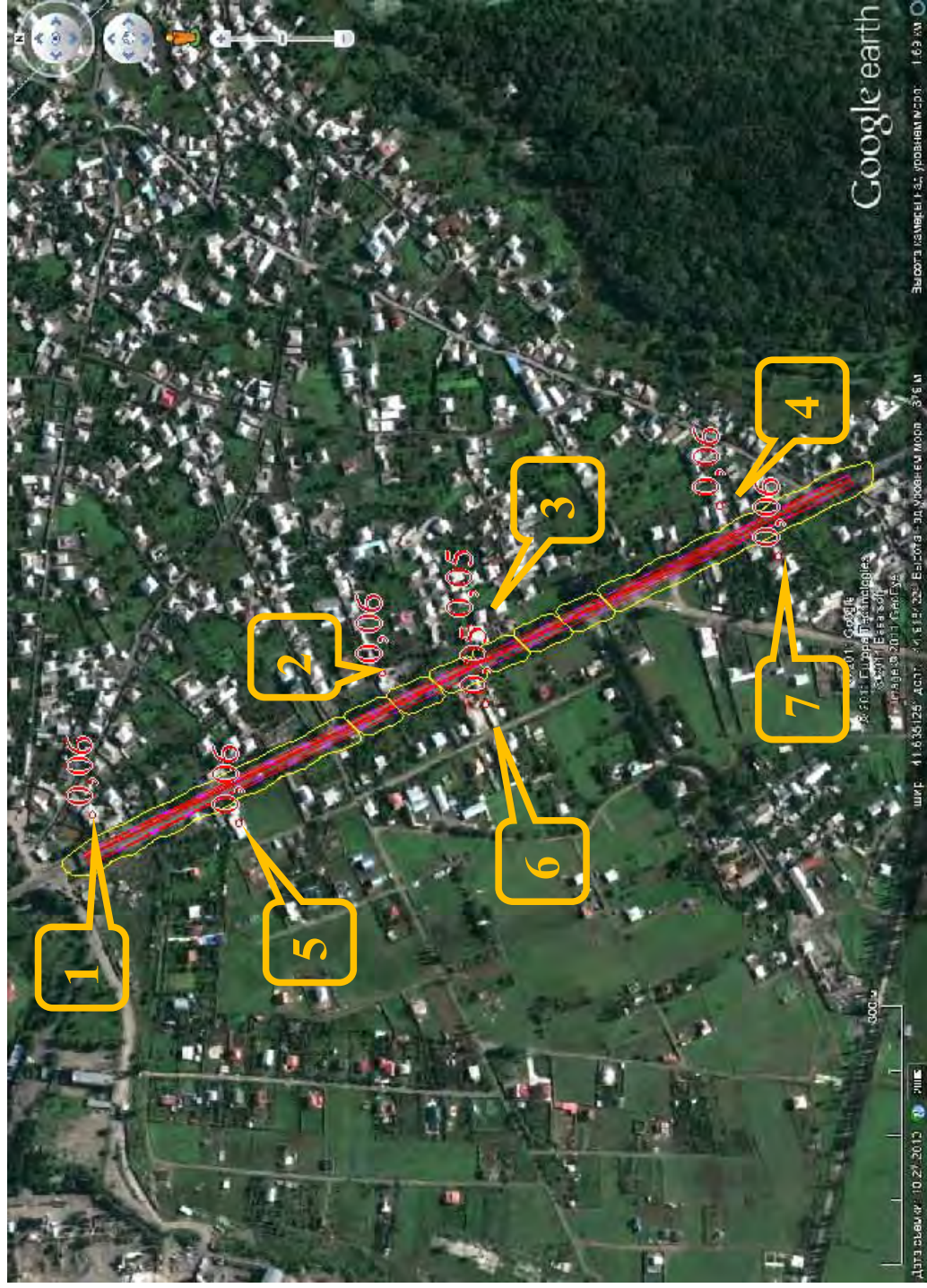
(Numbers imply maximum permissible concentration shares).

2011



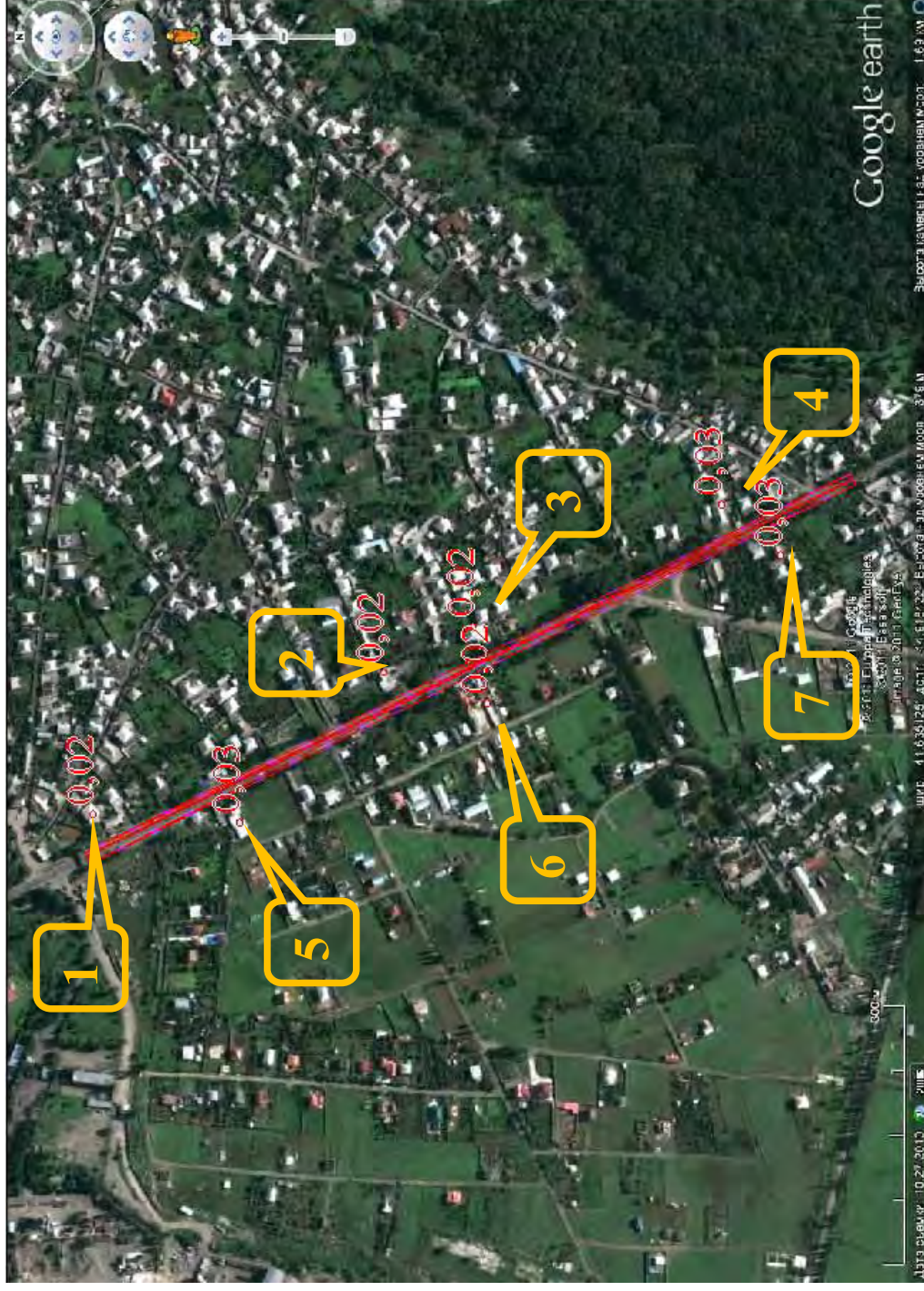
Air quality modeling for nitrogen dioxide (301)





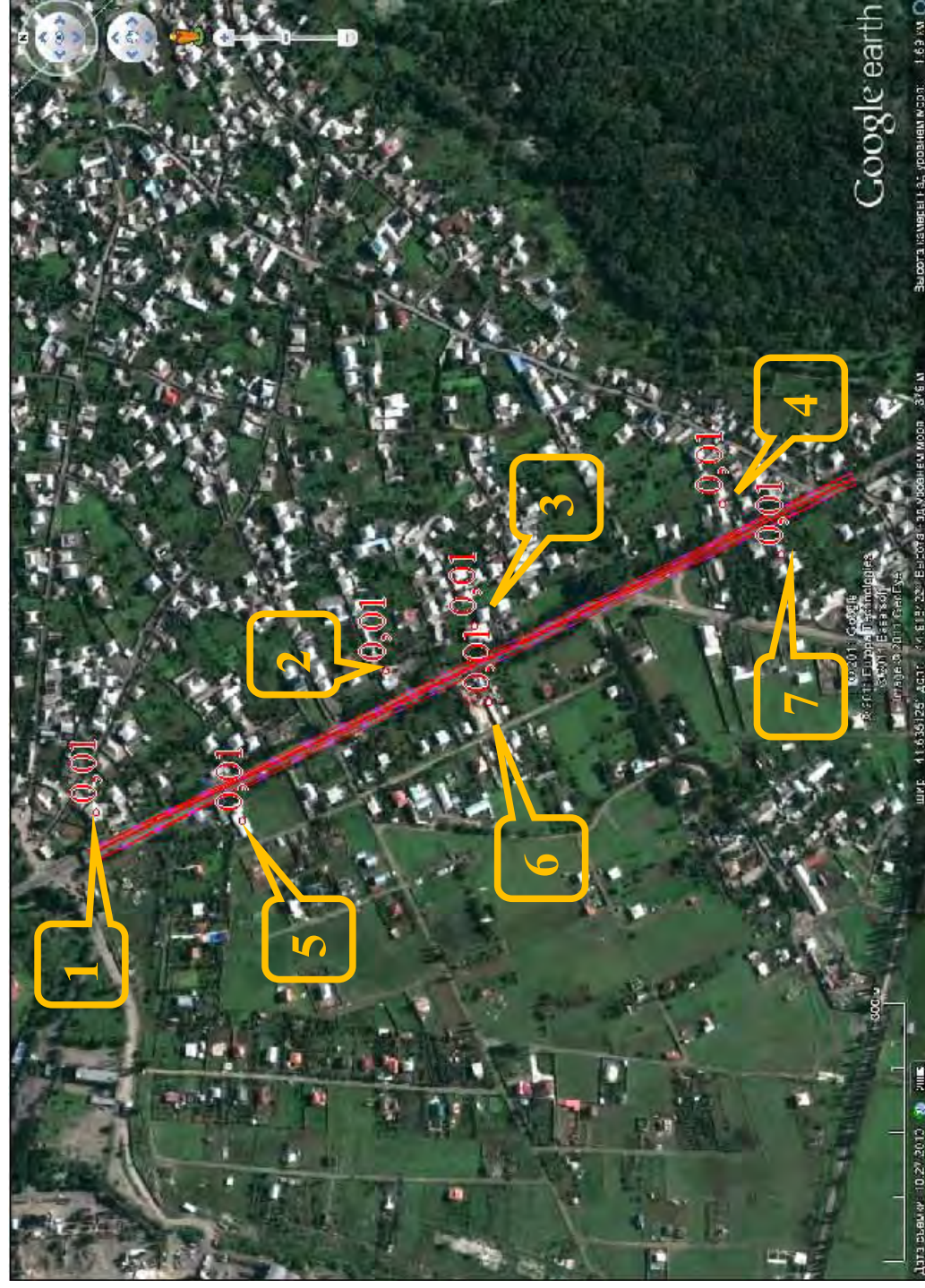
Air quality modeling for nitrogen oxide (304)



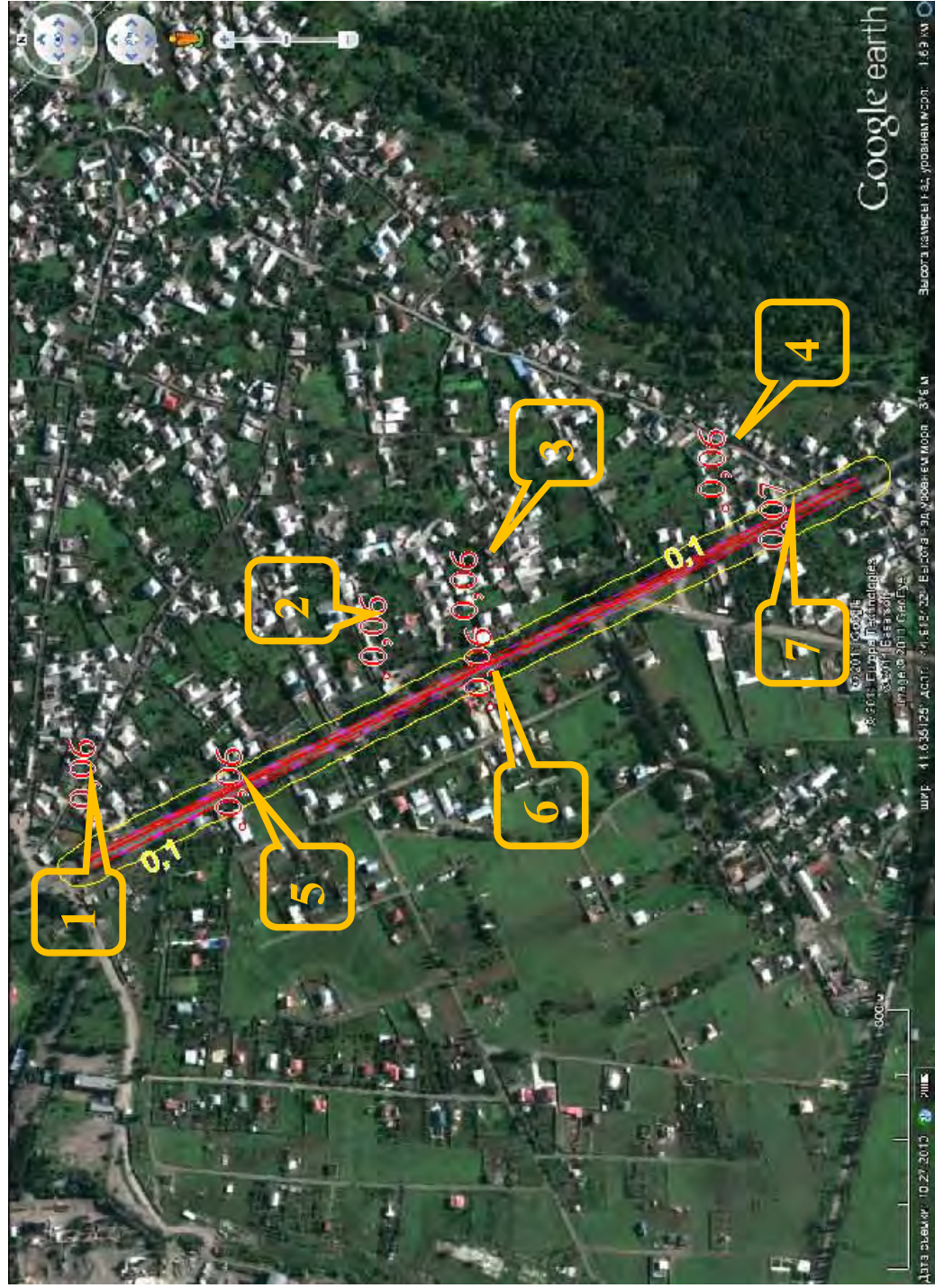


Air quality modeling for soot (328)



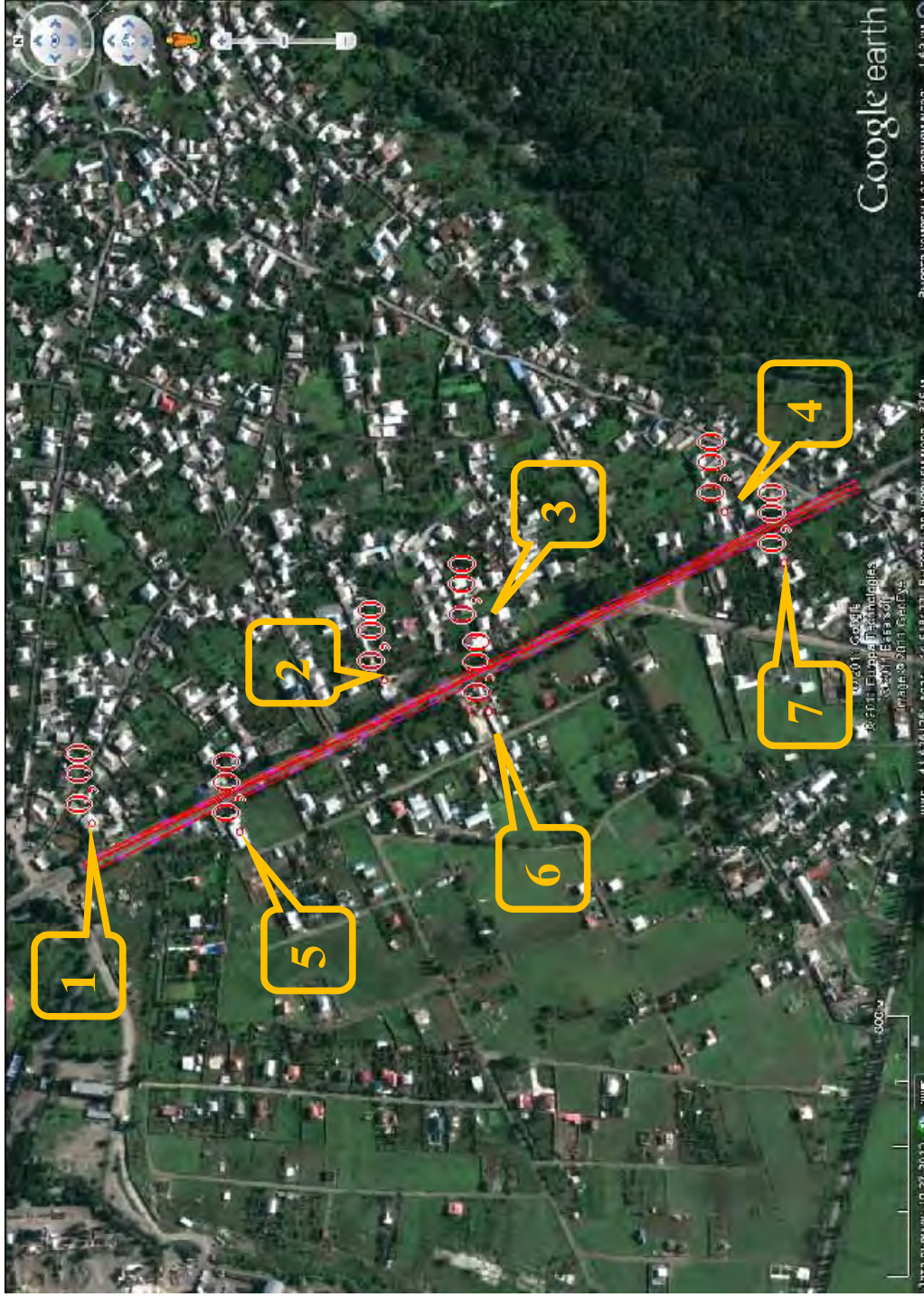






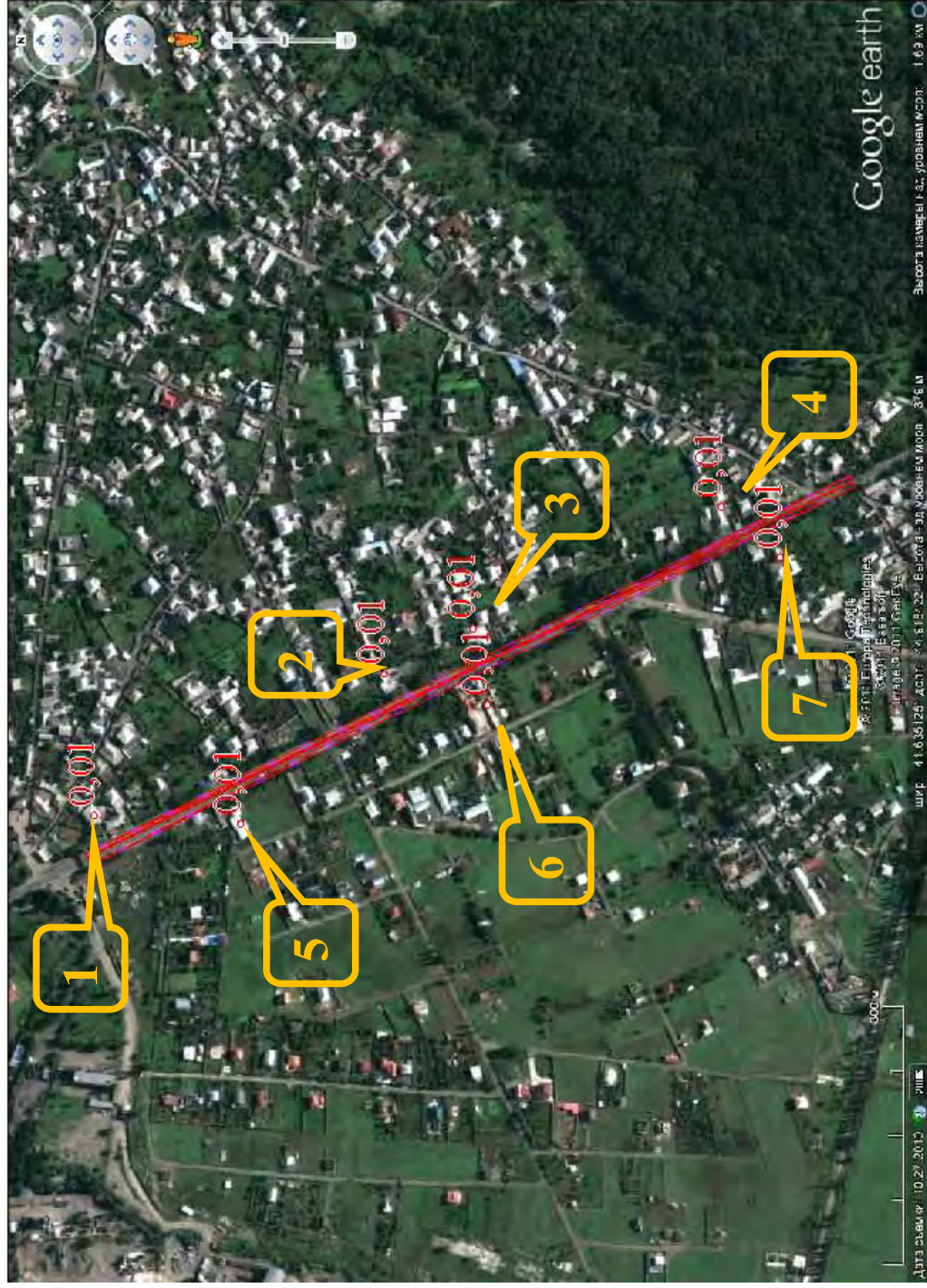
Air quality modeling for carbon oxide (337)





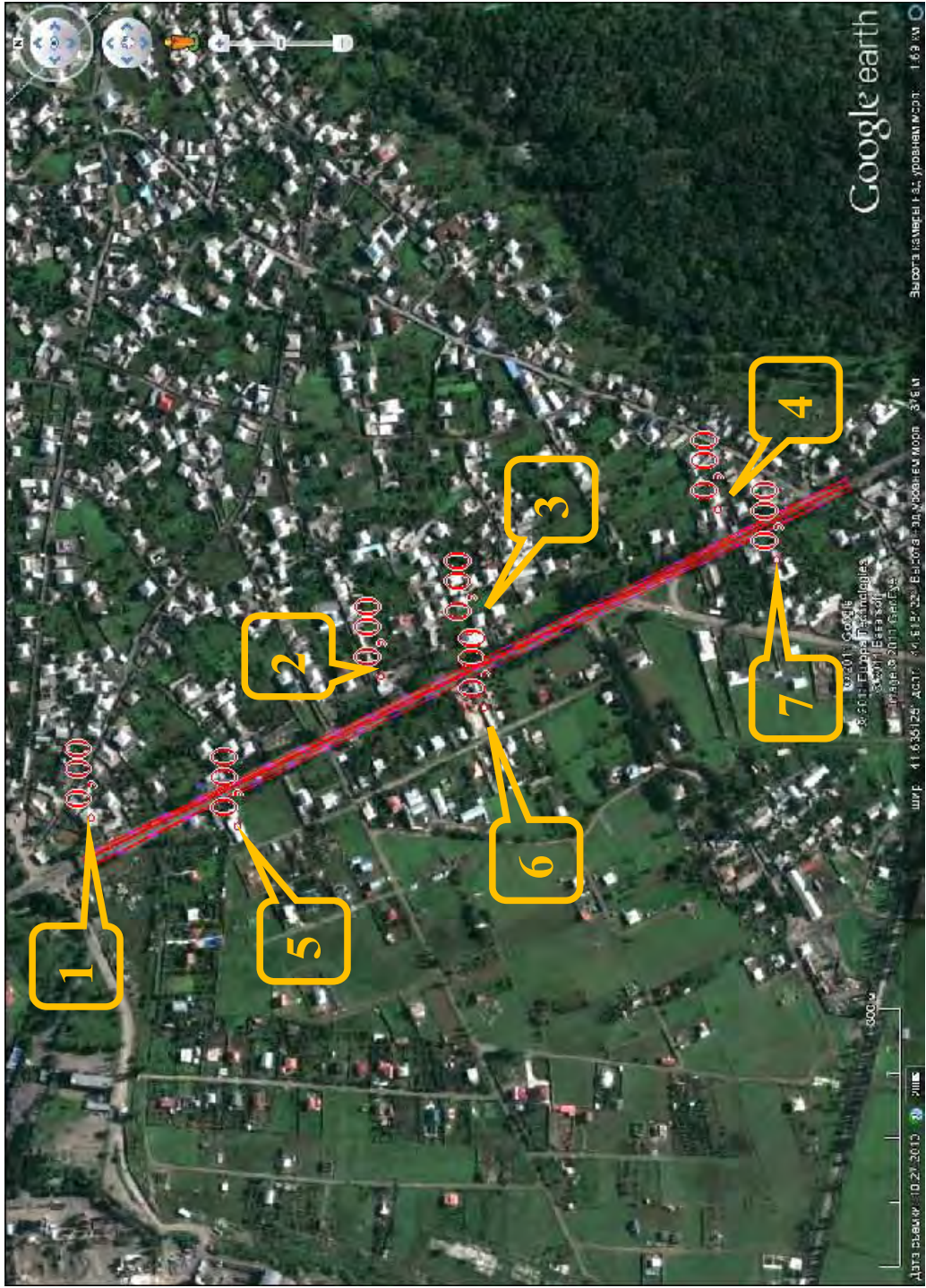
Air quality modeling for benzopyrene (703)





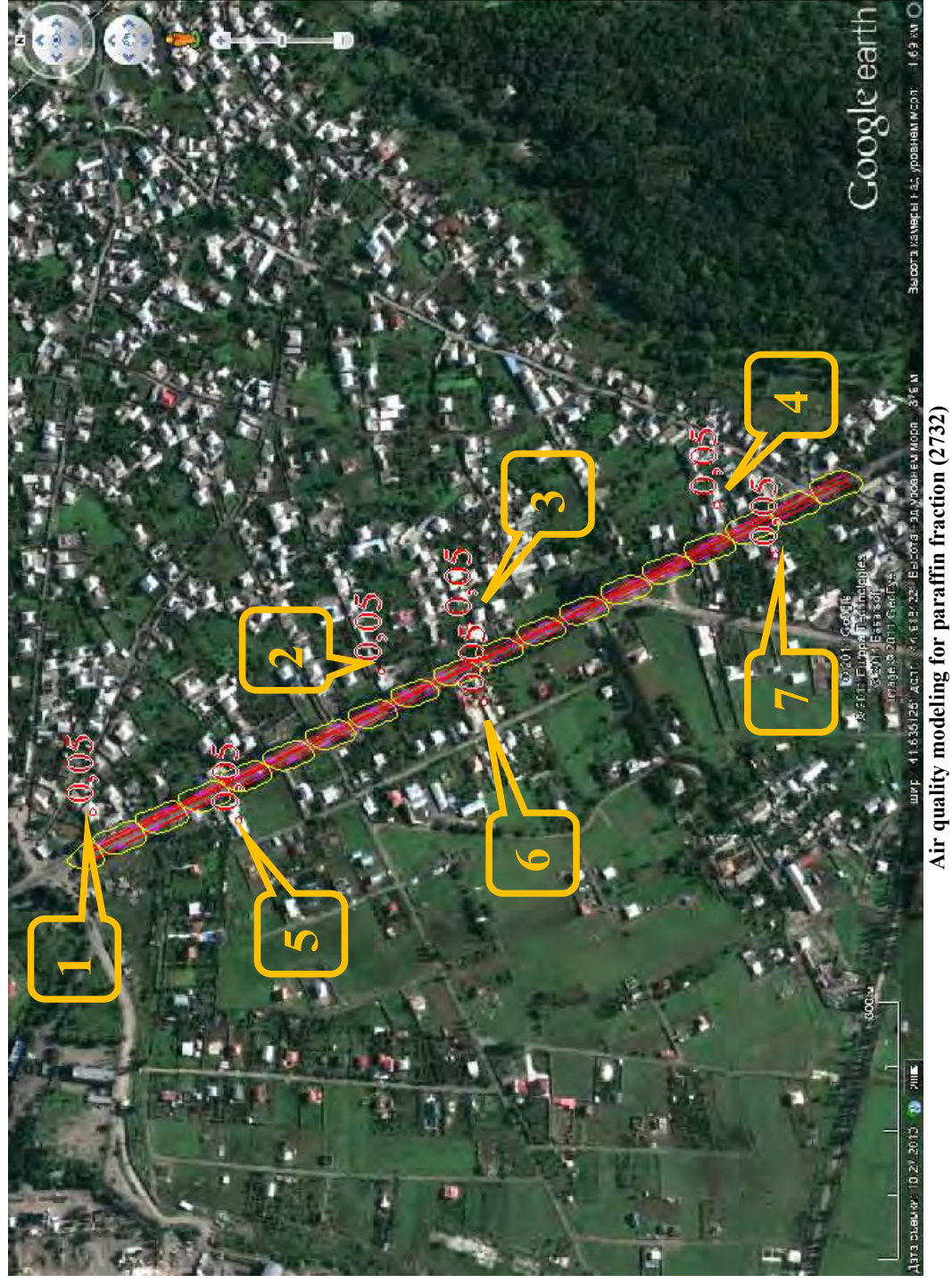
Air quality modeling for formaldehyde (1325)



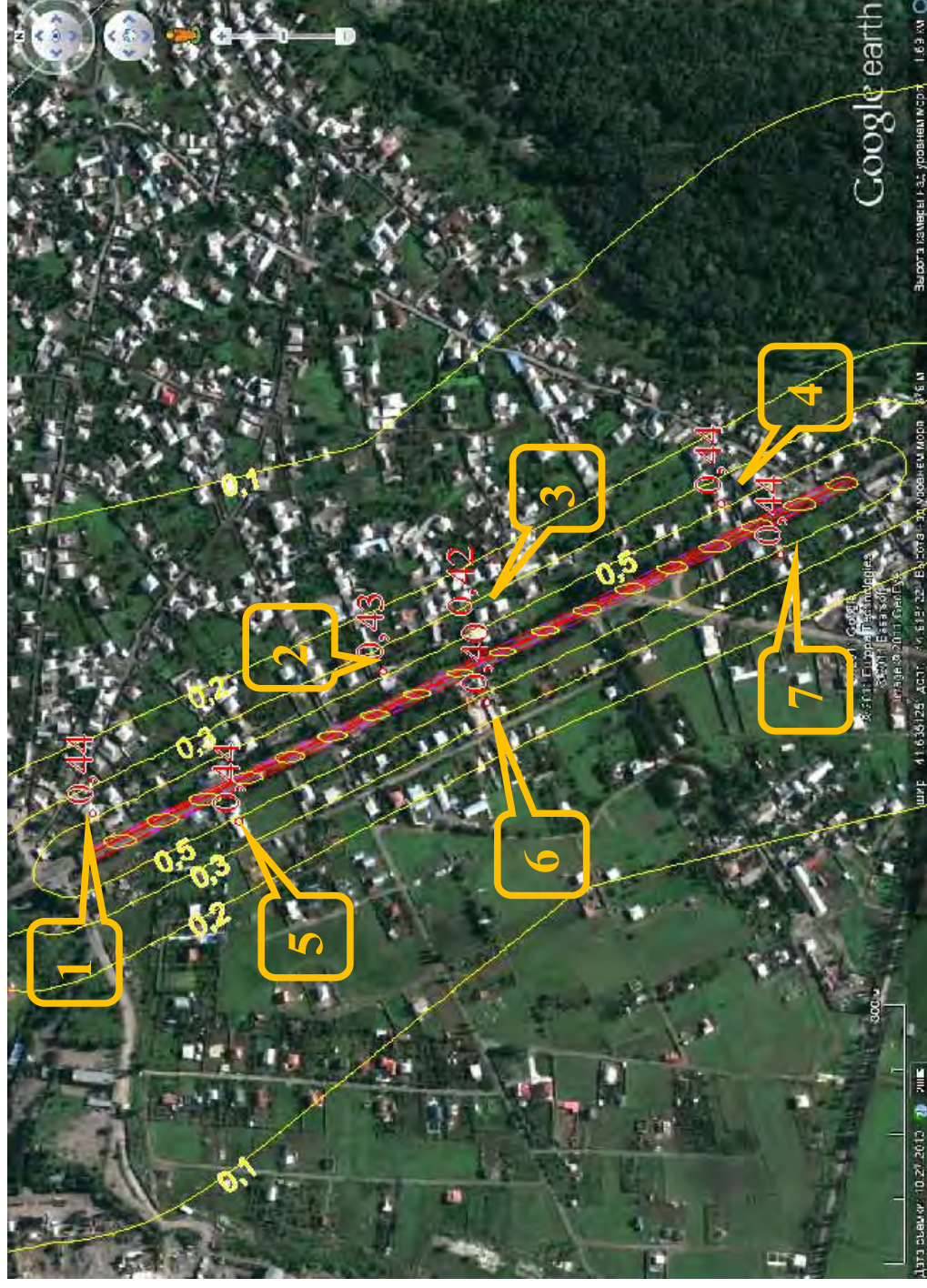


Air quality modeling for petrol fraction (2704)





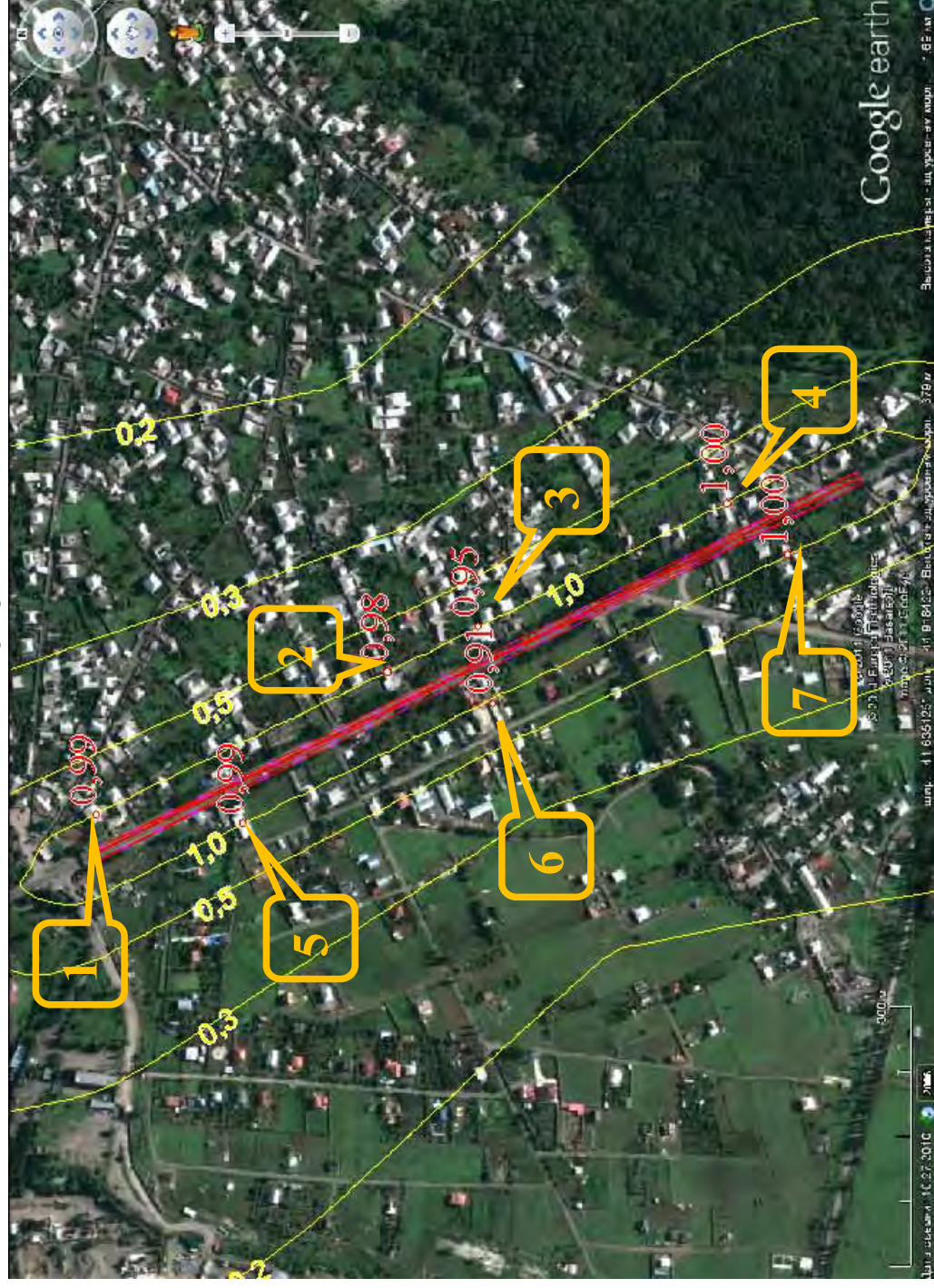




Air quality modeling for nitrogen dioxide (301) and sulphur dioxide (330) total impact (6053)

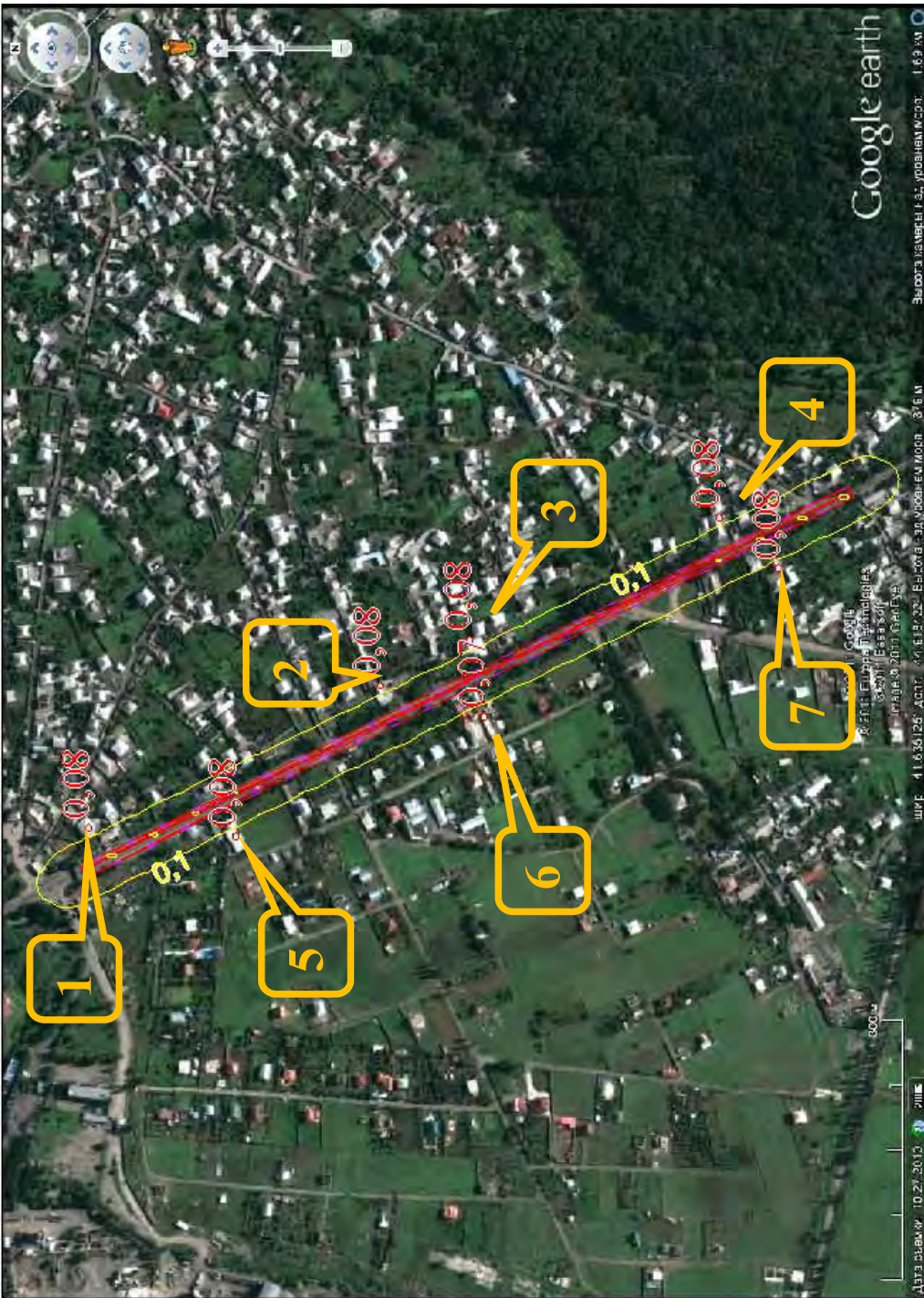


2016



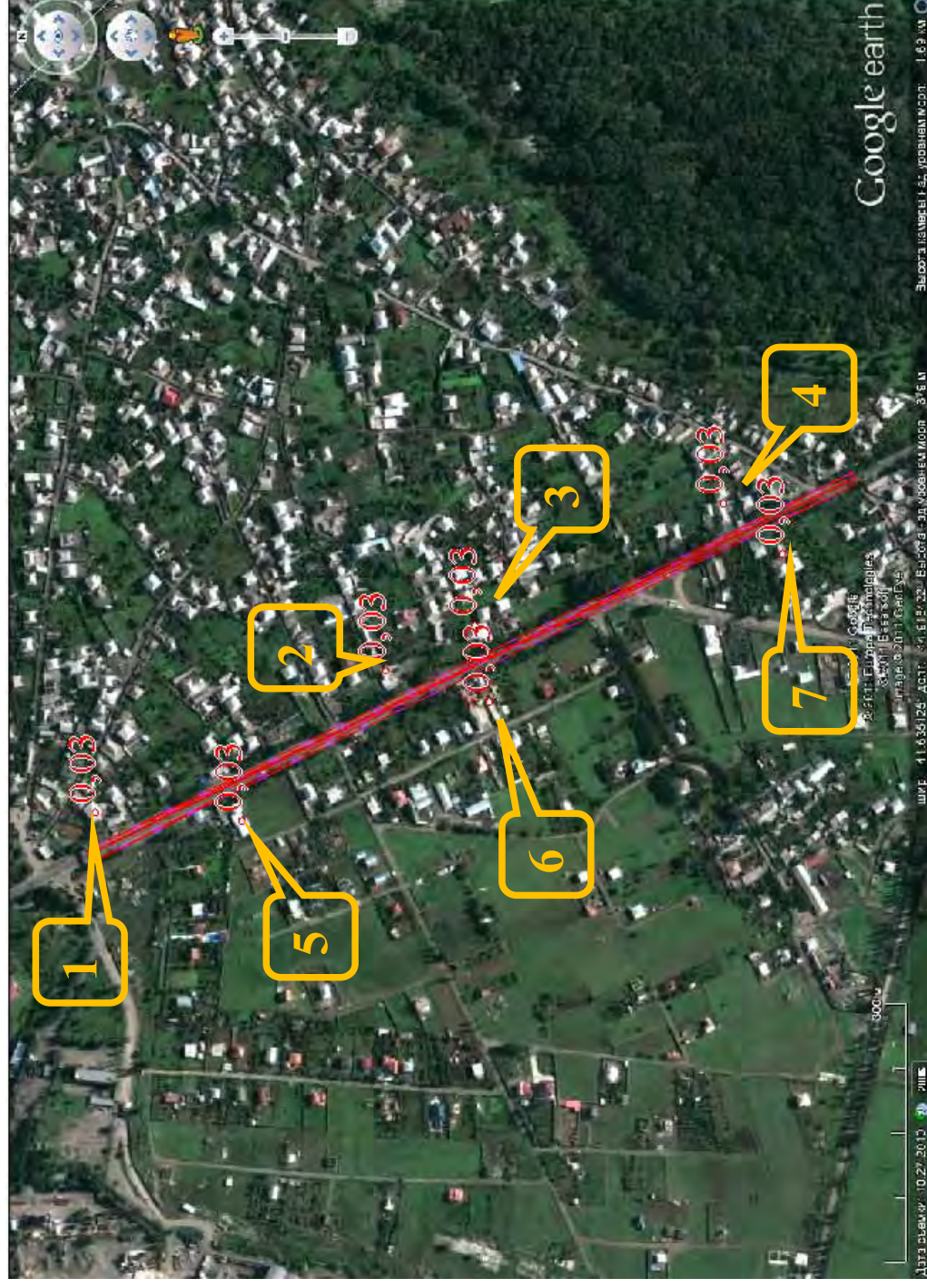
Air quality modeling for nitrogen dioxide (301)





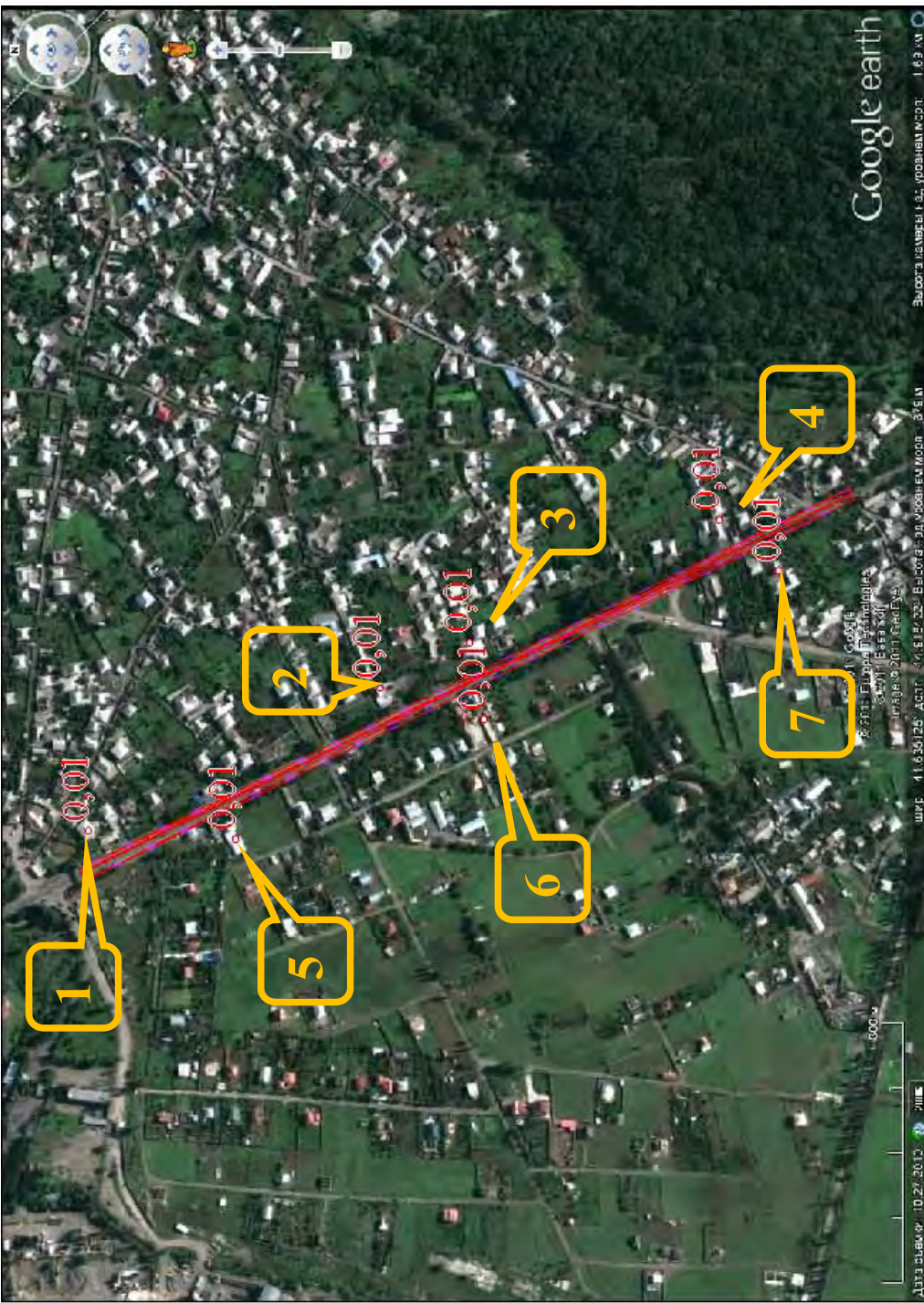
Air quality modeling for nitrogen oxide (304)





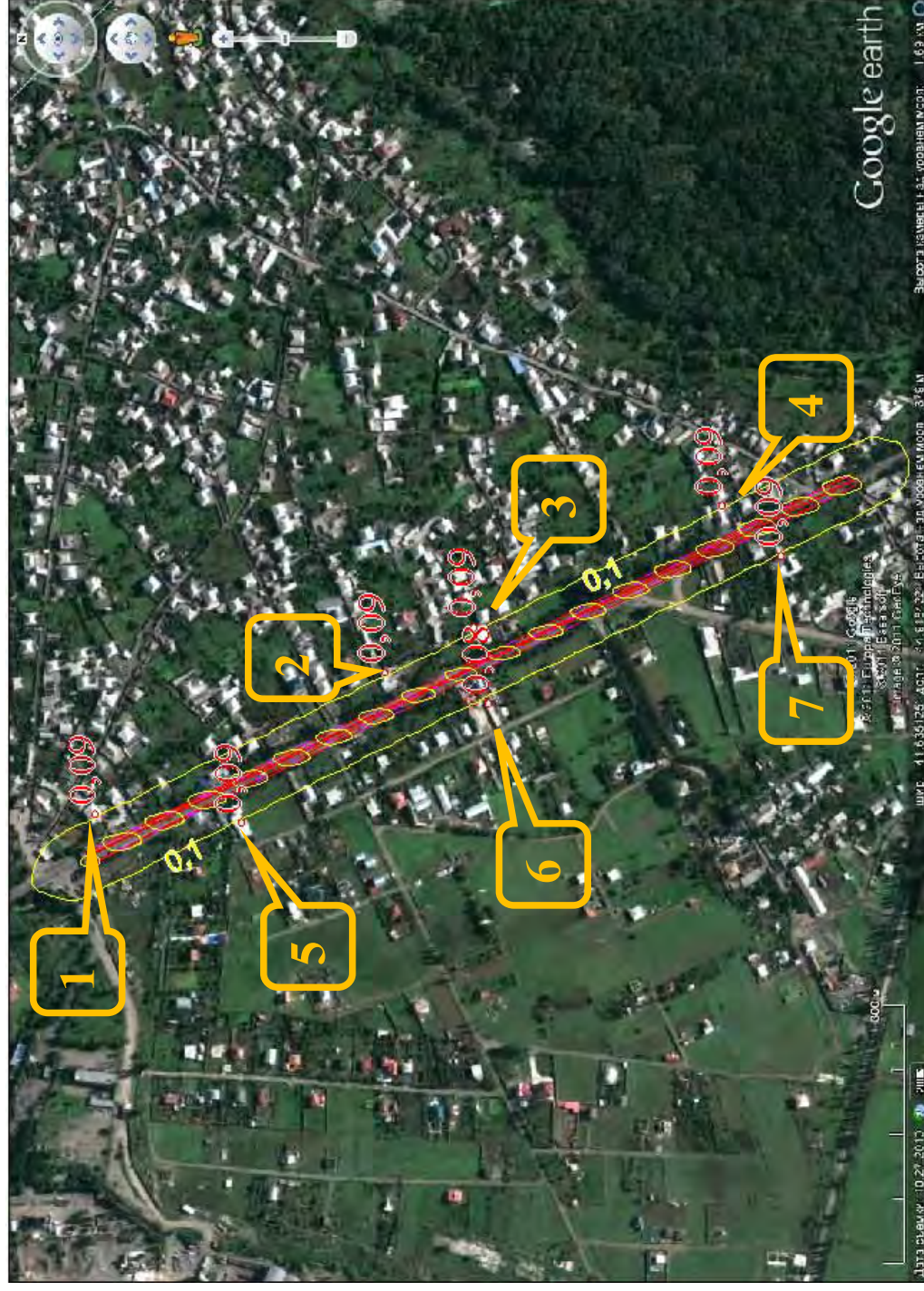
Air quality modeling for soot (328)





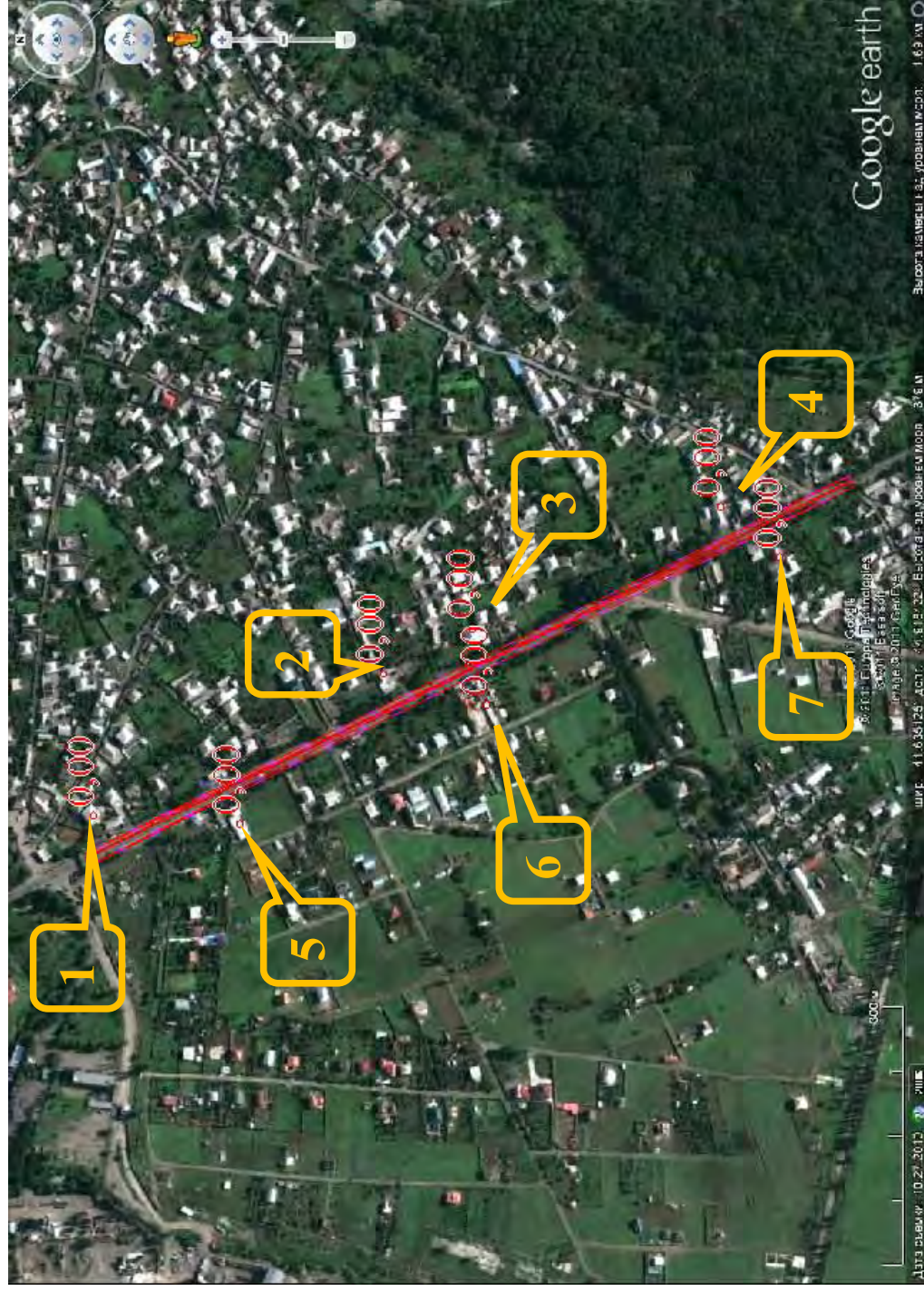
Air quality modeling for sulphur dioxide (330)



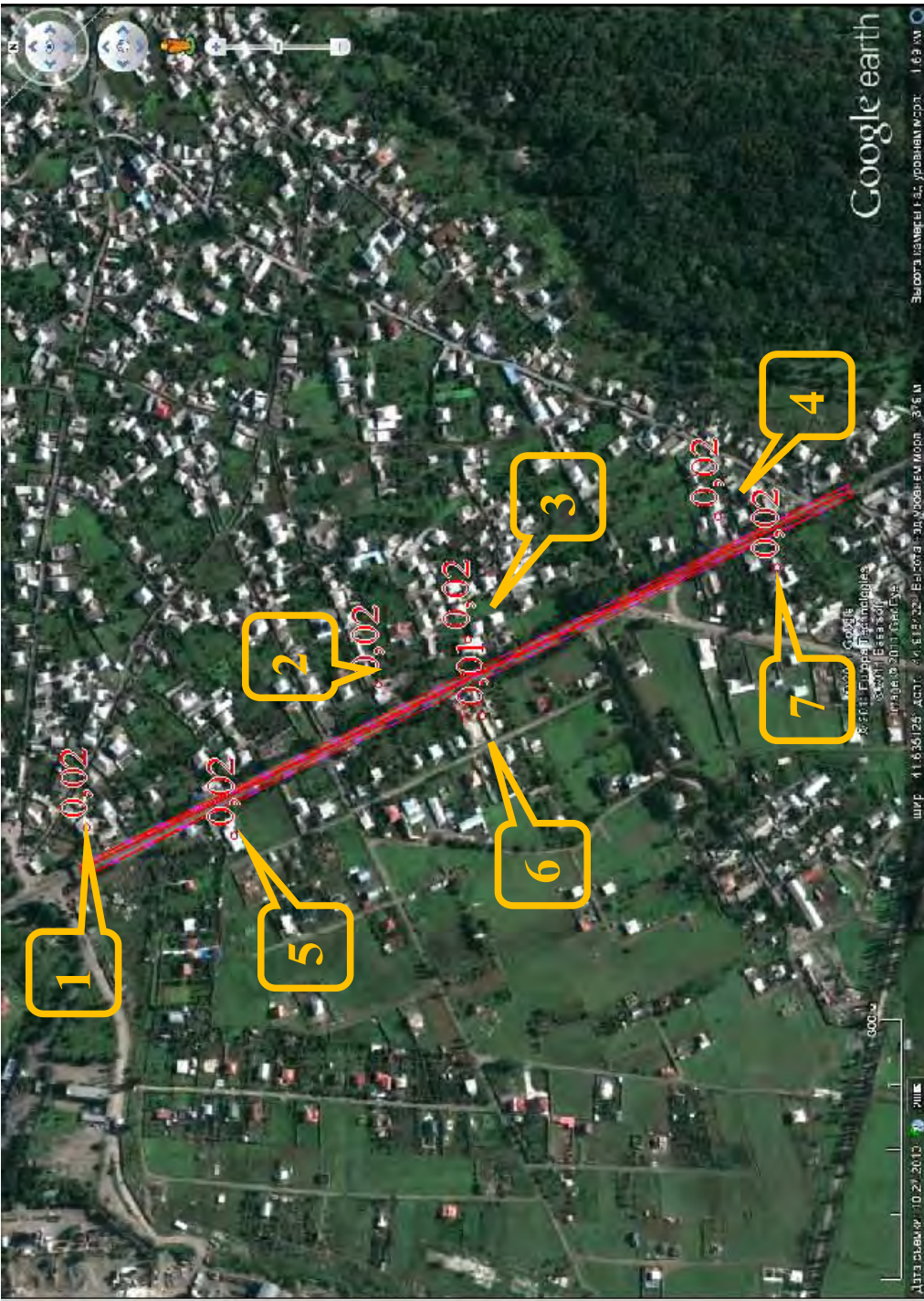


Air quality modeling for carbon oxide (337)



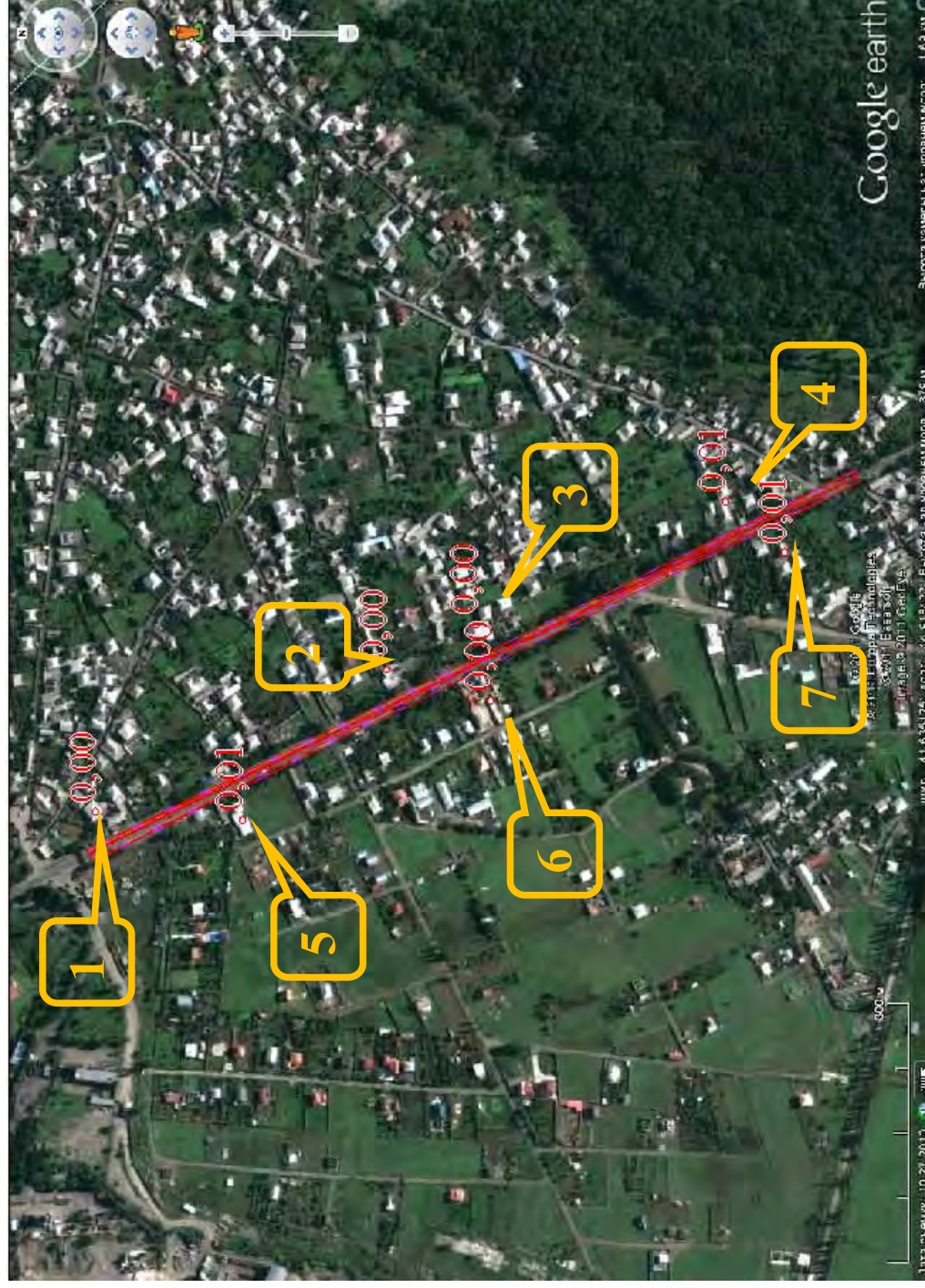






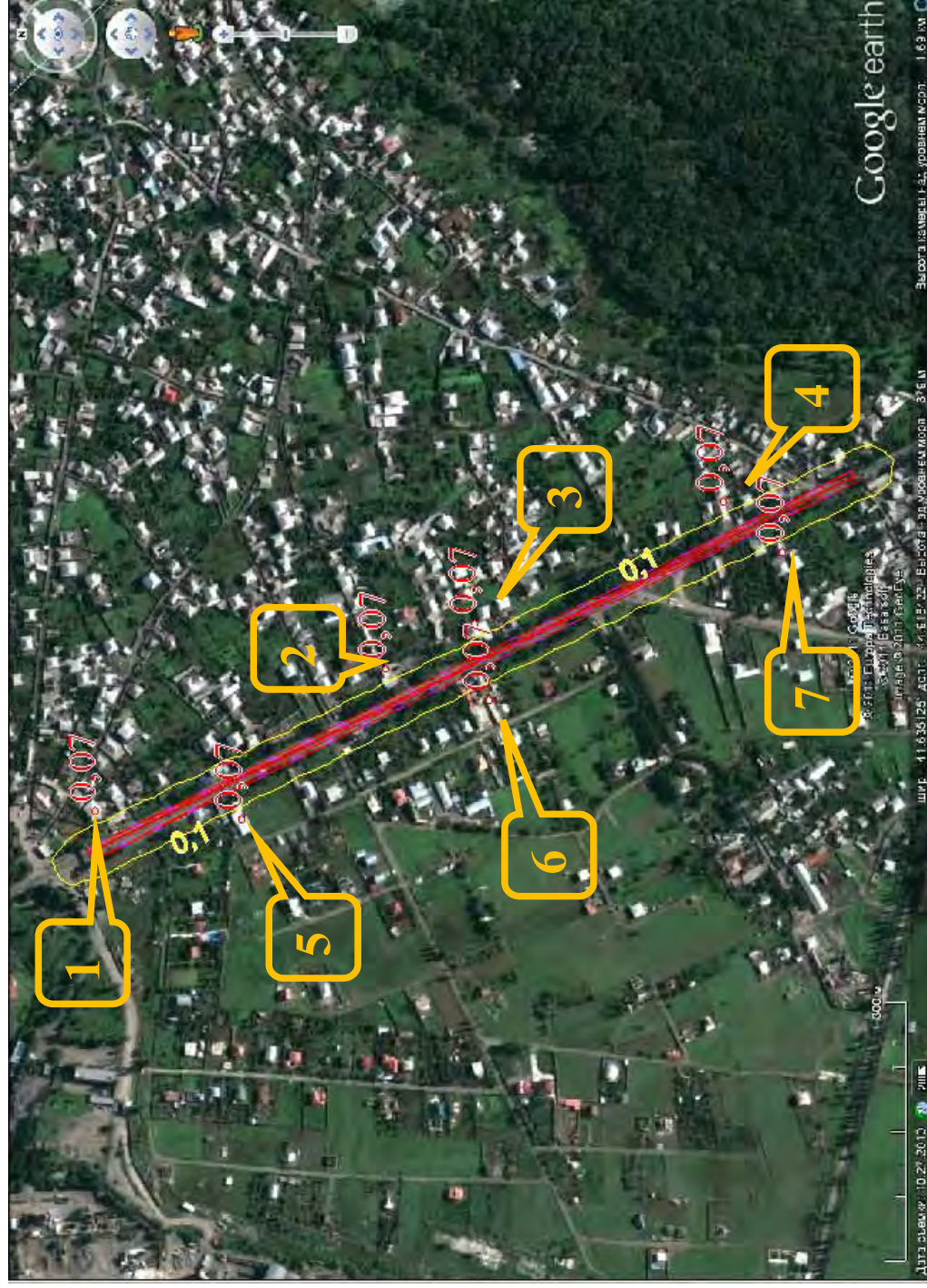
Air quality modeling for formaldehyde (1325)





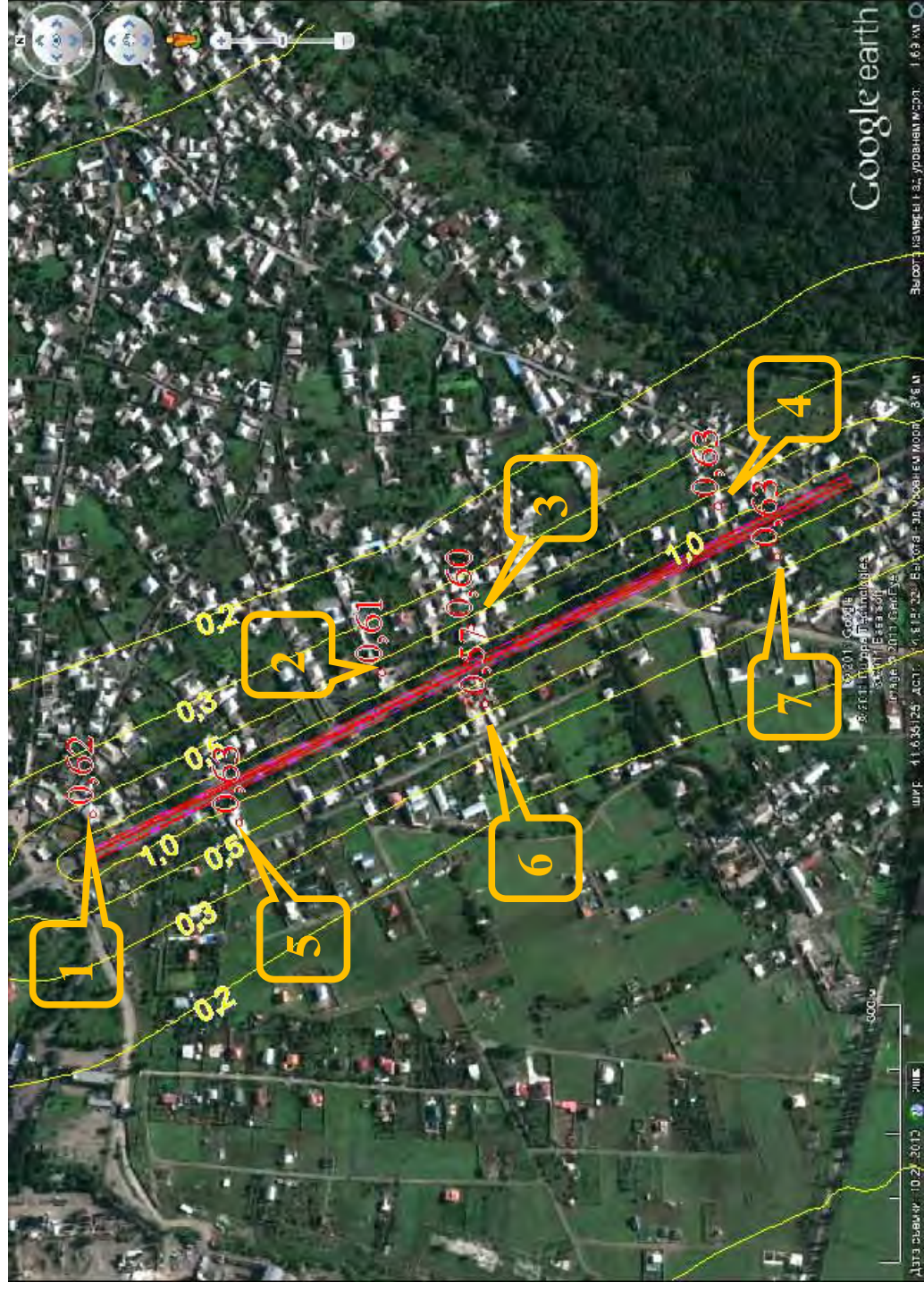
Air quality modeling for petrol fraction (2704)





Air quality modeling for paraffin fraction (2732)





### General Conclusion:

**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.**

Table data on concentration at control points in 2011-2016 are given in Appendix # 3 and Appendix # 4.

### Bibliography

1. “Методика определения выбросов вредных (загрязняющих) веществ в атмосферный воздух от автотранспортных потоков, движущихся по автомагистралям”. разработан НИИ охраны атмосферного воздуха (НИИ Атмосфера) Федеральной службы по экологическому, технологическому и атомному надзору от 8 декабря 2005 г. Санкт-Петербург.  
**(“Methodology of Determination of Harmful (Pollutant) Substance Dispersions in Ambient Air through Motor Traffic Moving on Highways”, developed by the Research Institute of Protection of Ambient Air (Research Institute Atmosphere) of the Federal Service on Ecological, Technological and Nuclear Supervision, 8<sup>th</sup> December, 2005, Saint-Petersburg)**
2. УПРЗА «Эколог-3» Санкт-Петербург, 2005 г.  
**Ecologist-3, Saint-Petersburg, 2005**



## Right Alignment

Vehicle emissions g/km	Group number	Carbon oxide	Nitrogen oxides	Hydrocarbons	Soot	Sulphur dioxide	Formaldehyde	Benzopyrene
Motor 1	I-1	5	1,3	1,1	0,03	0,03	0,005	4E-07
Motor 2	I-2	2	0,7	0,4	0,02	0,03	0,002	2E-07
Mini autobus	II	12	2	2,5	0,08	0,06	0,011	8E-07
Petrol autobus	III	35	5,2	8,5	0	0,04	0,04	1,2E-06
Diesel autobus	IV	7	6	5	0,3	0,07	0,025	0,000002
Petrol truck> 3,5t	V	60	5,2	10	0	0,05	0,05	0,000004
Diesel truck< 12 t	VI	9	7	5,5	0,4	0,1	0,025	0,000002
Diesel truck> 12 t	VII	12	8	6,5	0,5	0,12	0,03	2,4E-06
Motor 1 emission	I-1	0	0	0	0	0	0	0
Motor 2 emission	I-2	0,06944444	0,0486111	0,013888889	0,0006944	0,00104167	6,9444E-05	6,94E-09
Mini autobus emission	II	0,16666666	0,05555556	0,034722222	0,0011111	0,00083333	0,00015278	1,11E-08
Petrol autobus emission	III	0	0	0	0	0	0	0
Diesel autobus emission	IV	0,0097222	0,0166667	0,006944444	0,0004167	9,7222E-05	3,4722E-05	2,78E-09
Petrol truck> 3,5t emission	V	0	0	0	0	0	0	0
Diesel truck< 12 t	VI	0,01125	0,0175	0,006875	0,0005	0,000125	0,00003125	2,5E-09
Diesel truck> 12 t emission	VII	0	0	0	0	0	0	0
Total	I+VII	0,25708333	0,1383333	0,062430556	0,0027222	0,00209722	0,00028819	2,33E-08
"ML=((L-L0)/3600)*Mk*Gk*Rv								
Data for right alignment	I-1	I-2	II	III	IV	V	VI	VII
L km	1							
L0 km	0							
car/hour	0	250	100	0	10	0	9	0
Selected speed rate	0,5							

Respective speed (km/hour) rate									
10 (km/hour)	1,35					0,034722222			
15 (km/hour)	1,28								
20 (km/hour)	1,2								
25 (km/hour)	1,1								
30 (km/hour)	1								
35 (km/hour)	0,88								
40 (km/hour)	0,75								
45 (km/hour)	0,63								
50 (km/hour)	0,5								
60 (km/hour)	0,3								
75 (km/hour)	0,45								
80 (km/hour)	0,5								
100 (km/hour)	0,65								
Total for running track gr/sec									
Carbon oxide	0,257								
Nitrogen oxides, of which:	0,138								
Nitrogen dioxide	0,111								
Nitrogen oxide	0,018								
Hydrocarbons (2704)	0,014								
Hydrocarbons (2732)	0,049								
Soot	0,003								
Sulphur dioxide	0,002								
Formaldehyde	0,000								
Benzopyrene	2,33333E-08								

### Left Alignment

Vehicle emissions g/km	Group number	Carbon oxide	Nitrogen oxides	Hydrocarbons	Soot	Sulphur dioxide	Formaldehyde	Benzopyrene
Motor 1	I-1	5	1,3	1,1	0,03	0,03	0,005	4E-07
Motor 2	I-2	2	0,7	0,4	0,02	0,03	0,002	2E-07
Mini autobus	II	12	2	2,5	0,08	0,06	0,011	8E-07

Petrol autobus	III	35	5,2	8,5	0	0,04	0,04	1,2E-06
Diesel autobus	IV	7	6	5	0,3	0,07	0,025	0,000002
Petrol truck> 3,5t	V	60	5,2	10	0	0,05	0,05	0,000004
Diesel truck< 12 t	VI	9	7	5,5	0,4	0,1	0,025	0,000002
Diesel truck> 12 t	VII	12	8	6,5	0,5	0,12	0,03	2,4E-06
Motor 1 emission	I-1	0	0	0	0	0	0	0
Motor 2 emission	I-2	0,0713888 9	0,0499722	0,014277778	0,000713 9	0,00107083	7,1389E-05	7,14E-09
Mini autobus emission	II	0,1683333 3	0,0561111	0,035069444	0,001122 2	0,00084167	0,00015431	1,12E-08
Petrol autobus emission	III	0	0	0	0	0	0	0
Diesel autobus emission	IV	0,0106944 4	0,0183333	0,007638889	0,000458 3	0,00010694	3,8194E-05	3,06E-09
Petrol truck> 3,5t emission	V	0	0	0	0	0	0	0
Diesel truck< 12 t	VI	0,01125	0,0175	0,006875	0,0005	0,000125	0,00003125	2,5E-09
Diesel truck> 12 t emission	VII	0	0	0	0	0	0	0
Total	I+VII	0,2616666 7	0,1419167	0,063861111	0,002794 4	0,00214444	0,00029514	2,39E-08
"ML"=((L- L0)/3600)*Mk*Gk*Rv								
Data for right alignment	I-1	I-2	II	III	IV	V	VI	VII
L km	1							
L0 km	0							
car/hour	0	257	101	0	11	0	9	0
Selected speed rate	0,5							
Respective speed (km/hour) rate								
10 (km/hour)	1,35			0,035069444				
15 (km/hour)	1,28							
20 (km/hour)	1,2							
25 (km/hour)	1,1							



30 (km/hour)	1									
35 (km/hour)	0,88									
40 (km/hour)	0,75									
45 (km/hour)	0,63									
50 (km/hour)	0,5									
60 (km/hour)	0,3									
75 (km/hour)	0,45									
80 (km/hour)	0,5									
100 (km/hour)	0,65									
Total for running track gr/sec										
Carbon oxide	0,262									
Nitrogen oxides, of which:	0,142									
Nitrogen dioxide	0,114									
Nitrogen oxide	0,018									
Hydrocarbons (2704)	0,014									
Hydrocarbons (2732)	0,050									
Soot	0,003									
Sulphur dioxide	0,002									
Formaldehyde	0,000									
Benzopyrene	2,39167E-08									

### Total Emissions

Calculations of vehicle emission						
Town			Tbilisi-Rustavi			
Highway			Tbilisi-Rustavi highway			
Section			Tbilisi-Rustavi 1 km section			
Date in section						
Coordinates	X (m)	Y(m)	Z (width)			
Start	507	1004	15			
End	956	95				
Section length	1					
Data on transport flows						
Vehicle type, unit/hour (Gk)			Right	Left	km/h	Rate
			Alignment	Alignment		
Motor 1			0	0	80	0,5
Motor 2			250	257		
Mini autobus			100	101		
Petrol autobus			0	0		
Diesel autobus			10	11		
Petrol truck> 3,5t			0	0		
Diesel truck< 12 t			9	9		
Data on section emission						
Substance name		Code	Strength of total emission (g/sec)			
Carbon oxide (CO)		337	0,51875			
Nitrogen oxide (NOx)		3000	0,28025			
Nitrogen dioxide (NO2)		301	0,2242			
Nitrogen oxide (NO)		304	0,0364325			
Hydrocarbons (petrol fraction)		2704	0,028166667			
Hydrocarbons (diesel fraction)		2732	0,098125			
Soot		328	0,005516667			
Sulphur dioxide		330	0,004241667			
Formaldehyde		1325	0,000583333			
Benzopyrene		703	4,725E-08			

## Right Alignment

Vehicle emissions g/km	Group number	Carbon oxide	Nitrogen oxides	Hydrocarbons	Soot	Sulphur dioxide	Formaldehyde	Benzopyrene
Motor 1	I-1	5	1,3	1,1	0,03	0,03	0,005	4E-07
Motor 2	I-2	2	0,7	0,4	0,02	0,03	0,002	2E-07
Mini autobus	II	12	2	2,5	0,08	0,06	0,011	8E-07
Petrol autobus	III	35	5,2	8,5	0	0,04	0,04	1,2E-06
Diesel autobus	IV	7	6	5	0,3	0,07	0,025	0,000002
Petrol truck> 3,5t	V	60	5,2	10	0	0,05	0,05	0,000004
Diesel truck< 12 t	VI	9	7	5,5	0,4	0,1	0,025	0,000002
Diesel truck> 12 t	VII	12	8	6,5	0,5	0,12	0,03	2,4E-06
Motor 1 emission	I-1	0	0	0	0	0	0	0
Motor 2 emission	I-2	0,1	0,07	0,02	0,001	0,0015	0,0001	1E-08
Mini autobusemission	II	0,23333333	0,0777778	0,048611111	0,0015556	0,00116667	0,00021389	1,56E-08
Petrol autobusemission	III	0	0	0	0	0	0	0
Diesel autobusemission	IV	0,0136111	0,0233333	0,009722222	0,0005833	0,00013611	4,8611E-05	3,89E-09
Petrol truck> 3,5t emission	V	0	0	0	0	0	0	0
Diesel truck< 12 t	VI	0,01625	0,0252778	0,009930556	0,0007222	0,00018056	4,5139E-05	3,61E-09
Diesel truck> 12 t emission	VII	0	0	0	0	0	0	0
Total	I+VII	0,36319444	0,1963889	0,088263889	0,0038611	0,00298333	0,00040764	3,31E-08
"ML=(L-L0)/3600)*Mk*Gk*Rv								
Data for right alignment	I-1	I-2	II	III	IV	V	VI	VII
L km	1							
L0 km	0							
car/hour	0	360	140	0	14	0	13	0
Selected speed rate	0,5							



Respective speed (km/hour) rate										
10 (km/hour)	1,35									
15 (km/hour)	1,28						0,048611111			
20 (km/hour)	1,2									
25 (km/hour)	1,1									
30 (km/hour)	1									
35 (km/hour)	0,88									
40 (km/hour)	0,75									
45 (km/hour)	0,63									
50 (km/hour)	0,5									
60 (km/hour)	0,3									
75 (km/hour)	0,45									
80 (km/hour)	0,5									
100 (km/hour)	0,65									
Total for running track gr/sec										
Carbon oxide	0,363									
Nitrogen oxides, of which:	0,196									
Nitrogen dioxide	0,157									
Nitrogen oxide	0,026									
Hydrocarbons (2704)	0,020									
Hydrocarbons (2732)	0,068									
Soot	0,004									
Sulphur dioxide	0,003									
Formaldehyde	0,000									
Benzopyrene	3,30556E-08									

### Left Alignment

Vehicle emissions g/km	Group number	Carbon oxide	Nitrogen oxides	Hydrocarbons	Soot	Sulphur dioxide	Formaldehyde	Benzopyrene
Motor 1	I-1	5	1,3	1,1	0,03	0,03	0,005	4E-07
Motor 2	I-2	2	0,7	0,4	0,02	0,03	0,002	2E-07
Mini autobus	II	12	2	2,5	0,08	0,06	0,011	8E-07

Petrol autobus	III	35	5,2	8,5	0	0,04	0,04	1,2E-06
Diesel autobus	IV	7	6	5	0,3	0,07	0,025	0,000002
Petrol truck> 3,5t	V	60	5,2	10	0	0,05	0,05	0,000004
Diesel truck< 12 t	VI	9	7	5,5	0,4	0,1	0,025	0,000002
Diesel truck> 12 t	VII	12	8	6,5	0,5	0,12	0,03	2,4E-06
Motor 1 emission	I-1	0	0	0	0	0	0	0
Motor 2 emission	I-2	0,10111111	0,0707778	0,020222222	0,0010111	0,00151667	0,00010111	1,01E-08
Mini autobus emission	II	0,2433333	0,0811111	0,050694444	0,0016222	0,00121667	0,00022306	1,62E-08
Petrol autobus emission	III	0	0	0	0	0	0	0
Diesel autobus emission	IV	0,0155555	0,0266667	0,011111111	0,0006666	0,00015556	5,5556E-05	4,44E-09
Petrol truck> 3,5t emission	V	0	0	0	0	0	0	0
Diesel truck< 12 t	VI	0,015	0,0233333	0,009166667	0,0006666	0,00016667	4,1667E-05	3,33E-09
Diesel truck> 12 t emission	VII	0	0	0	0	0	0	0
Total	I+VII	0,375	0,2018889	0,091194444	0,0039666	0,00305556	0,00042139	3,41E-08
"ML=((L-L0)/3600)*Mk*Gk*Rv								
Data for right alignment	I-1	I-2	II	III	IV	V	VI	VII
L km	1							
L0 km	0							
car/hour	0	364	146	0	16	0	12	0
Selected speed rate	0,5							
Respective speed (km/hour) rate								
10 (km/hour)	1,35			0,050694444				
15 (km/hour)	1,28							
20 (km/hour)	1,2							

25 (km/hour)	1,1									
30 (km/hour)	1									
35 (km/hour)	0,88									
40 (km/hour)	0,75									
45 (km/hour)	0,63									
50 (km/hour)	0,5									
60 (km/hour)	0,3									
75 (km/hour)	0,45									
80 (km/hour)	0,5									
100 (km/hour)	0,65									
Total for running track gr/sec										
Carbon oxide	0,375									
Nitrogen oxides, of which:	0,202									
Nitrogen dioxide	0,162									
Nitrogen oxide	0,026									
Hydrocarbons (2704)	0,020									
Hydrocarbons (2732)	0,071									
Soot	0,004									
Sulphur dioxide	0,003									
Formaldehyde	0,000									
Benzopyrene	3,4111E-08									

# Total Emissions

Calculations of vehicle emission						
Town			Tbilisi-Rustavi			
Highway			Tbilisi-Rustavi highway			
Section			Tbilisi-Rustavi 1 km section			
Date in section						
Coordinates	X (m)	Y(m)	Z (width)			
Start	507	1004	15			
End	956	95				
Section length	1					
Data on transport flows						
Vehicle type, unit/hour (Gk)			Right	Left	km/h	Rate
			Alignment	Alignment		
Motor 1			0	0	80	0,5
Motor 2			360	364		
Mini autobus			140	146		
Petrol autobus			0	0		
Diesel autobus			14	16		
Petrol truck> 3,5t			0	0		
Diesel truck< 12 t			13	12		
Diesel truck<12 t			0	0		
Data on section emission						
Substance name			Code	Strength of total emission (g/sec)		
Carbon oxide (CO)			337	0,738194444		
Nitrogen oxide (NOx)			3000	0,398277778		
Nitrogen dioxide (NO2)			301	0,318622222		
Nitrogen oxide (NO)			304	0,051776111		
Hydrocarbons (petrol fraction)			2704	0,040222222		
Hydrocarbons (diesel fraction)			2732	0,139236111		
Soot			328	0,007827778		
Sulphur dioxide			330	0,006038889		
Formaldehyde			1325	0,000829028		
Benzopyrene			703	6,71667E-08		



**Plant number 313; road**

Town Tbilisi-Rustavi

**Initial data version: 2, road 2011**

**Calculation version: road 2011**

**Calculation completed for: summer**

**Calculation module: "ОНД-86"**

**Calculable constants: E1= 0,01, E2=0,01, E3=0,01, S=999999,99 sq.km.**

**Meteorological Parameters**

Average air temperature of the hottest month	30,8° C
Average air temperature of the coldest month	-2,4° C
Rate depending on the air stratification temperature, A	200
Maximum wind speed for the given territory (excess recurrence within 5 %)	8 m/sec

**Plant Structure (Squares, Workshop)**

Number	Square (workshop) name
--------	------------------------

## Dispersion Source Parameters

Records:

"o/n" - Source considered with exclusion of background;

"u+n" - Source considered without exclusion of background;

"u" - Source is not considered and its share not included in the background.

Source types:

1 - Point;

2 - Linear;

3 - Unorganized;

4 -Unity of point sources for calculation in one plane;

5 -Unorganized with dispersion strength changing over time;

6 -Point sources with umbrella or horizontal dispersion;

7 -Unity of point sources with umbrella or horizontal dispersion;

8 - Highway.

Record s during other calcula tion	Square #	Works hop #	Source #	Source name	Version	Type	Source height (m)	Diameter (m)	Air mixture volume (m3/sec)	Air mixture speed (m/sec)	Air mixture temperatu re (°C)	Relief rate	Coord. X1 axis (m)	Coord. Y1 axis (m)	Coord.. X2 axis (m)	Coord. Y2 axis (m)	Source width (m)
	%	0	0	Highway	1	8	2,0	0,00	0	0,000000	0	1,0	507,0	1004,0	956,0	95,0	15,00
Subst. Code																	
0304	Substance																
0328	Nitrogen (II) oxide (nitrogen oxide)																
0330	Black carbon (soot)																
0337	Sulphur dioxide																
0703	Carbon oxide																
1325	Benzopyrene (3,4-benzopyrene)																
2704	Formaldehyde																
2732	Petrol fraction																
0301	Paraffin fraction																
	Nitrogen dioxide																
					Dispersion (g/sec)		Dispersion (t/year)		F	sum.:	Cm/MPC	Xm	U <sub>m</sub>	wint.:	Cm/MPC	Xm	U <sub>m</sub>
					0,0360000		0,0000000		1		3,214	11,4	0,5		3,214	11,4	0,5
					0,0060000		0,0000000		1		1,429	11,4	0,5		1,429	11,4	0,5
					0,0050000		0,0000000		1		0,357	11,4	0,5		0,357	11,4	0,5
					0,5190000		0,0000000		1		3,707	11,4	0,5		3,707	11,4	0,5
					5,000000e-8		0,0000000		1		0,179	11,4	0,5		0,179	11,4	0,5
					0,0006000		0,0000000		1		0,612	11,4	0,5		0,612	11,4	0,5
					0,0290000		0,0000000		1		0,207	11,4	0,5		0,207	11,4	0,5
					0,0990000		0,0000000		1		2,947	11,4	0,5		2,947	11,4	0,5
					0,2240000		0,0000000		1		40,003	11,4	0,5		40,003	11,4	0,5

## Emissions from Source by Substances

Records:

"%" - Source considered with exclusion of background;  
 "+" - Source considered without exclusion of background;  
 "-" - Source is not considered and its share not included in the background.

(-) marked or unmarked () sources are not considered in the total sum

Source types:

1 - Point;  
 2 - Linear;  
 3 - Unorganized;  
 4 - Unity of point sources for calculation in one plane;  
 5 - Unorganized with dispersion strength changing over time;  
 6 - Point sources with umbrella or horizontal dispersion;  
 7 - Unity of point sources with umbrella or horizontal dispersion;  
 8 - Highway.

### Substance: 0304 Nitrogen (II) Oxide (nitrogenoxide)

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0,0360000	1	3,2145	11,40	0,5000	3,2145	11,40	0,5000
<b>total:</b>					<b>0,0360000</b>		<b>3,2145</b>			<b>3,2145</b>		

### Substance: 0328 Black Carbon (Soot)

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0,0060000	1	1,4287	11,40	0,5000	1,4287	11,40	0,5000
<b>total:</b>					<b>0,0060000</b>		<b>1,4287</b>			<b>1,4287</b>		

### Substance: 0330 SulphurDioxide

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0,0050000	1	0,3572	11,40	0,5000	0,3572	11,40	0,5000
<b>total:</b>					<b>0,0050000</b>		<b>0,3572</b>			<b>0,3572</b>		

### Substance: 0337 CarbonOxide

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0,5190000	1	3,7074	11,40	0,5000	3,7074	11,40	0,5000
<b>total:</b>					<b>0,5190000</b>		<b>3,7074</b>			<b>3,7074</b>		

### Substance: 0703 Benzopyrene (3,4-Benzopyrene)

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	5,000000e-8	1	0,1786	11,40	0,5000	0,1786	11,40	0,5000
<b>total:</b>					<b>5,000000e-8</b>		<b>0,1786</b>			<b>0,1786</b>		

**Substance: 1325 Formaldehyde**

# square	# work shop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0,0006000	1	0,6123	11,40	0,5000	0,6123	11,40	0,5000
<b>total:</b>					<b>0,0006000</b>		<b>0,6123</b>			<b>0,6123</b>		

**Substance: 2704 Petrol Fraction**

# square	# work shop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0,0290000	1	0,2072	11,40	0,5000	0,2072	11,40	0,5000
<b>total:</b>					<b>0,0290000</b>		<b>0,2072</b>			<b>0,2072</b>		

**Substance: 2732 Paraffin Fraction**

# square	# work shop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0,0990000	1	2,9466	11,40	0,5000	2,9466	11,40	0,5000
<b>total:</b>					<b>0,0990000</b>		<b>2,9466</b>			<b>2,9466</b>		

**Substance: 0301 NitrogenDioxide**

# square	# work shop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0,2240000	1	40,0025	11,40	0,5000	40,0025	11,40	0,5000
<b>total:</b>					<b>0,2240000</b>		<b>40,0025</b>			<b>40,0025</b>		

**Source Dispersion by Total Impact Groups**

Records:

"%" - Source considered with exclusion of background;  
 "+" - Source considered without exclusion of background;  
 "-" -Source is not considered and its share not included in the background.

(-) marked or unmarked () sources are not considered in the total sum

Source types:

1 - Point;  
 2 - Linear;  
 3 - Unorganized;  
 4 -Unity of point sources for calculation in one plane;  
 5 -Unorganized with dispersion strength changing over time;  
 6 -Point sources with umbrella or horizontal dispersion;  
 7 -Unity of point sources with umbrella or horizontal dispersion;  
 8 - Highway.

**Total impact group: 6053**

# square	# work shop	# source	Type	Record	Code	dispersion (g/sec)	F	Summer			Winter		
								Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0330	0,0050000	1	0,3572	11,40	0,5000	0,3572	11,40	0,5000
0	0	1	8	%	0301	0,2240000	1	40,0025	11,40	0,5000	40,0025	11,40	0,5000
<b>total:</b>						<b>0,2290000</b>		<b>40,3597</b>			<b>40,3597</b>		

**Calculation Completed by Substances (Total Impact Groups)**



Code	substance	Maximum Permissible Concentration			Rate of ecologic situation	Background concentration	
		Type	Handbook value	Used in calculation		Records	Interp.
0304	Nitrogen (II) oxide (nitrogenoxide)	max. unit	0,4000000	0,4000000	1	No	No
0328	Black carbon (soot)	max. unit	0,1500000	0,1500000	1	No	No
0330	Sulphur dioxide	max. unit	0,5000000	0,5000000	1	No	No
0337	Carbonoxide	max. unit	5,0000000	5,0000000	1	No	No
0703	Benzopyrene (3,4-benzopyrene)	MPCaverage daily * 10	0,0000010	0,0000100	1	No	No
1325	Formaldehyde	max. unit	0,0350000	0,0350000	1	No	No
2704	Petrol fraction	max. unit	5,0000000	5,0000000	1	No	No
2732	Paraffin fraction	Orient. safe impact level	1,2000000	1,2000000	1	No	No
0301	Nitrogen dioxide	max. unit	0,2000000	0,2000000	1	No	No
6053	Total impact group (2) 0301 330	Group	-	-	1	No	No

### Sorting of Calculable Meteo-Parameters Automatic Sorting

Wind speed sorting is completed automatically

Wind direction

Sector start	Sector end	Wind soring step
0	360	1

### Calculable Area

### Calculable Squares

#	Type	Full square description				Width (m)	Step (m)		Height (m)	Comment
		Middle point coordinates, I side (m)		Middle point coordinates, II side(m)						
		X	Y	X	Y		X	Y		
1	Given	0	550	1500	550	1100	25	25	2	

### Calculable Points

#	Point coordinates (m)		Height (m)	Point type	Comment
	X	Y			
1	558,00	999,00	2	Point at the border with populated area	
2	727,00	654,00	2	Point at the border with populated area	
3	781,00	547,00	2	Point at the border with populated area	
4	926,00	252,00	2	Point at the border with populated area	
5	548,00	825,00	2	Point at the border with populated area	
6	690,00	530,00	2	Point at the border with populated area	
7	866,00	181,00	2	Point at the border with populated area	

### Calculation Results by Substances (Calculable Points)

Point types:

0 –User calculable point

1 –Point at the border with protection zone

2 –Point at the border with industrial zone

3 –Point at the border with sanitary-protection zone

4 –Point at the border with populated area

5 –At the border of development

#	Coord.X(m)	Coord.Y(m)	Height (m)	Concentration (MPC share)	Wind direction	Wind speed	Background (MPC share)	Background before exclusion	Point type
---	------------	------------	------------	---------------------------	----------------	------------	------------------------	-----------------------------	------------

**Substance: 0304 Nitrogen (II) Oxide (nitrogenoxide)**

7	866	181	2	0,06	1	0,50	0,000	0,000	4
4	926	252	2	0,06	306	0,50	0,000	0,000	4
5	548	825	2	0,06	126	0,50	0,000	0,000	4
1	558	999	2	0,06	181	0,50	0,000	0,000	4
2	727	654	2	0,06	184	0,50	0,000	0,000	4
3	781	547	2	0,05	302	0,50	0,000	0,000	4
6	690	530	2	0,05	120	0,50	0,000	0,000	4

**Substance: 0328 Black Carbon (Soot)**

7	866	181	2	0,03	1	0,50	0,000	0,000	4
4	926	252	2	0,03	306	0,50	0,000	0,000	4
5	548	825	2	0,03	126	0,50	0,000	0,000	4
1	558	999	2	0,02	181	0,50	0,000	0,000	4
2	727	654	2	0,02	184	0,50	0,000	0,000	4
3	781	547	2	0,02	302	0,50	0,000	0,000	4
6	690	530	2	0,02	120	0,50	0,000	0,000	4

**Substance: 0330 SulphurDioxide**

7	866	181	2	6,3e-3	1	0,50	0,000	0,000	4
4	926	252	2	6,3e-3	306	0,50	0,000	0,000	4
5	548	825	2	6,3e-3	126	0,50	0,000	0,000	4
1	558	999	2	6,2e-3	181	0,50	0,000	0,000	4
2	727	654	2	6,1e-3	184	0,50	0,000	0,000	4
3	781	547	2	6,0e-3	302	0,50	0,000	0,000	4
6	690	530	2	5,7e-3	120	0,50	0,000	0,000	4

**Substance: 0337 CarbonOxide**

7	866	181	2	0,07	1	0,50	0,000	0,000	4
4	926	252	2	0,06	306	0,50	0,000	0,000	4
5	548	825	2	0,06	126	0,50	0,000	0,000	4
1	558	999	2	0,06	181	0,50	0,000	0,000	4
2	727	654	2	0,06	184	0,50	0,000	0,000	4
3	781	547	2	0,06	302	0,50	0,000	0,000	4
6	690	530	2	0,06	120	0,50	0,000	0,000	4

**Substance: 0703 Benzopyrene (3,4-benzopyrene)**

7	866	181	2	3,1e-3	1	0,50	0,000	0,000	4
4	926	252	2	3,1e-3	306	0,50	0,000	0,000	4
5	548	825	2	3,1e-3	126	0,50	0,000	0,000	4
1	558	999	2	3,1e-3	181	0,50	0,000	0,000	4
2	727	654	2	3,1e-3	184	0,50	0,000	0,000	4
3	781	547	2	3,0e-3	302	0,50	0,000	0,000	4
6	690	530	2	2,9e-3	120	0,50	0,000	0,000	4

**Substance: 1325 Formaldehyde**

7	866	181	2	0,01	1	0,50	0,000	0,000	4
4	926	252	2	0,01	306	0,50	0,000	0,000	4

5	548	825	2	0,01	126	0,50	0,000	0,000	4
1	558	999	2	0,01	181	0,50	0,000	0,000	4
2	727	654	2	0,01	184	0,50	0,000	0,000	4
3	781	547	2	0,01	302	0,50	0,000	0,000	4
6	690	530	2	9,8e-3	120	0,50	0,000	0,000	4

**Substance: 2704 Petrol Fraction**

7	866	181	2	3,6e-3	1	0,50	0,000	0,000	4
4	926	252	2	3,6e-3	306	0,50	0,000	0,000	4
5	548	825	2	3,6e-3	126	0,50	0,000	0,000	4
1	558	999	2	3,6e-3	181	0,50	0,000	0,000	4
2	727	654	2	3,6e-3	184	0,50	0,000	0,000	4
3	781	547	2	3,5e-3	302	0,50	0,000	0,000	4
6	690	530	2	3,3e-3	120	0,50	0,000	0,000	4

**Substance: 2732 Paraffin Fraction**

7	866	181	2	0,05	1	0,50	0,000	0,000	4
4	926	252	2	0,05	306	0,50	0,000	0,000	4
5	548	825	2	0,05	126	0,50	0,000	0,000	4
1	558	999	2	0,05	181	0,50	0,000	0,000	4
2	727	654	2	0,05	184	0,50	0,000	0,000	4
3	781	547	2	0,05	302	0,50	0,000	0,000	4
6	690	530	2	0,05	120	0,50	0,000	0,000	4

**Substance: 0301 NitrogenDioxide**

7	866	181	2	0,70	1	0,50	0,000	0,000	4
4	926	252	2	0,70	306	0,50	0,000	0,000	4
5	548	825	2	0,70	126	0,50	0,000	0,000	4
1	558	999	2	0,70	181	0,50	0,000	0,000	4
2	727	654	2	0,69	184	0,50	0,000	0,000	4
3	781	547	2	0,67	302	0,50	0,000	0,000	4
6	690	530	2	0,64	120	0,50	0,000	0,000	4

**Substance: 6053 Total Impact Group (2) 0301 330**

7	866	181	2	0,44	1	0,50	0,000	0,000	4
4	926	252	2	0,44	306	0,50	0,000	0,000	4
5	548	825	2	0,44	126	0,50	0,000	0,000	4
1	558	999	2	0,44	181	0,50	0,000	0,000	4
2	727	654	2	0,43	184	0,50	0,000	0,000	4
3	781	547	2	0,42	302	0,50	0,000	0,000	4
6	690	530	2	0,40	120	0,50	0,000	0,000	4

**Plant number 313; road**  
Town Tbilisi-Rustavi

**Initial data version: 3, road 2016**  
**Calculation version: road 2016**  
**Calculation completed for: summer**  
**Calculation module: "ОНД-86"**  
**Calculable constants: E1= 0,01, E2=0,01, E3=0,01, S=999999,99 sq.km.**

**Meteorological Parameters**

Average air temperature of the hottest month	30,8° C
Average air temperature of the coldest month	-2,4° C
Rate depending on the air stratification temperature, A	200
Maximum wind speed for the given territory (excess recurrence within 5 %)	8 m/sec

**Plant Structure (Squares, Workshop)**

Number	Square (workshop) name
--------	------------------------



## Dispersion Source Parameters

Records:

"o/n" - Source considered with exclusion of background;

"u+" - Source considered without exclusion of background;

"u" - Source is not considered and its share not included in the background.

Source types:

1 - Point;

2 - Linear;

3 - Unorganized;

4 -Unity of point sources for calculation in one plane;

5 -Unorganized with dispersion strength changing over time;

6 -Point sources with umbrella or horizontal dispersion;

7 -Unity of point sources with umbrella or horizontal dispersion;

8 - Highway.

Record s during other calcula tion %	Square #	Works hop #	Source #	Source name	Version	Type	Source height (m)	Diameter (m)	Air mixture volume (m3/sec)	Air mixture speed (m/sec)	Air mixture temperatu re (°C)	Relief rate	Coord. X1 axis (m)	Coord. Y1 axis (m)	Coord.. X2 axis (m)	Coord. Y2 axis (m)	Source width (m)
	0	0	1	Highway	1	8	2,0	0,00	0	0,000000	0	1,0	507,0	1004,0	956,0	95,0	15,00
Subst. Code																	
0304	Substance																
	Nitrogen (II) oxide (nitrogen oxide)																
0328	Black carbon (soot)																
0330	Sulphur dioxide																
0337	Carbon oxide																
0703	Benzopyrene (3,4-benzopyrene)																
1325	Formaldehyde																
2704	Petrol fraction																
2732	Paraffin fraction																
0301	Nitrogen dioxide																
						Dispersion (g/sec)	Dispersion (t/year)	F	sum.:	Cm/MPC	Xm	Um	wint.:	Cm/MPC	Xm	Um	
						0,0520000	0,0000000	1	4,643	11,4	0,5	4,643	11,4	0,5	1,905	11,4	0,5
						0,0080000	0,0000000	1	1,905	11,4	0,5	1,905	11,4	0,5	0,429	11,4	0,5
						0,0060000	0,0000000	1	0,429	11,4	0,5	0,429	11,4	0,5	5,279	11,4	0,5
						0,7390000	0,0000000	1	5,279	11,4	0,5	5,279	11,4	0,5	0,250	11,4	0,5
						7,000000e-8	0,0000000	1	0,250	11,4	0,5	0,250	11,4	0,5	0,918	11,4	0,5
						0,0009000	0,0000000	1	0,918	11,4	0,5	0,918	11,4	0,5	0,286	11,4	0,5
						0,0400000	0,0000000	1	0,286	11,4	0,5	0,286	11,4	0,5	4,167	11,4	0,5
						0,1400000	0,0000000	1	4,167	11,4	0,5	4,167	11,4	0,5	56,789	11,4	0,5
						0,3180000	0,0000000	1	56,789	11,4	0,5	56,789	11,4	0,5			

## Emissions from Source by Substances

Records:

"%" - Source considered with exclusion of background;

"+" - Source considered without exclusion of background;

"-" -Source is not considered and its share not included in the background.

(-) marked or unmarked () sources are not considered in the total sum

Source types:

1 - Point;

2 - Linear;

3 - Unorganized;

4 -Unity of point sources for calculation in one plane;

5 -Unorganized with dispersion strength changing over time;

6 -Point sources with umbrella or horizontal dispersion;

7 -Unity of point sources with umbrella or horizontal dispersion;

8 - Highway.

### Substance: 0304 Nitrogen (II) Oxide (nitrogenoxide)

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	11	8	%	0,0520000	1	4,6431	11,40	0,5000	4,6431	11,40	0,5000
<b>total:</b>					<b>0,0520000</b>		<b>4,6431</b>			<b>4,6431</b>		

### Substance: 0328 Black Carbon (Soot)

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	11	8	%	0,0080000	1	1,9049	11,40	0,5000	1,9049	11,40	0,5000
<b>total:</b>					<b>0,0080000</b>		<b>1,9049</b>			<b>1,9049</b>		

### Substance: 0330 SulphurDioxide

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	11	8	%	0,0060000	1	0,4286	11,40	0,5000	0,4286	11,40	0,5000
<b>total:</b>					<b>0,0060000</b>		<b>0,4286</b>			<b>0,4286</b>		

### Substance: 0337 CarbonOxide

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	11	8	%	0,7390000	1	5,2789	11,40	0,5000	5,2789	11,40	0,5000
<b>total:</b>					<b>0,7390000</b>		<b>5,2789</b>			<b>5,2789</b>		

### Substance: 0703 Benzopyrene (3,4-Benzopyrene)

#	#	#	Type	Record	dispersion	F	Summer	Winter
---	---	---	------	--------	------------	---	--------	--------

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F						
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	11	8	%	7,000000e-8	1	0,2500	11,40	0,5000	0,2500	11,40	0,5000
<b>total:</b>					<b>7,000000e-8</b>		<b>0,2500</b>			<b>0,2500</b>		

**Substance: 1325 Formaldehyde**

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	11	8	%	0,0009000	1	0,9184	11,40	0,5000	0,9184	11,40	0,5000
<b>total:</b>					<b>0,0009000</b>		<b>0,9184</b>			<b>0,9184</b>		

**Substance: 2704 Petrol Fraction**

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	11	8	%	0,0400000	1	0,2857	11,40	0,5000	0,2857	11,40	0,5000
<b>total:</b>					<b>0,0400000</b>		<b>0,2857</b>			<b>0,2857</b>		

**Substance: 2732 Paraffin Fraction**

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	11	8	%	0,1400000	1	4,1669	11,40	0,5000	4,1669	11,40	0,5000
<b>total:</b>					<b>0,1400000</b>		<b>4,1669</b>			<b>4,1669</b>		

**Substance: 0301 NitrogenDioxide**

# square	# workshop	# source	Type	Record	dispersion (g/sec)	F	Summer			Winter		
							Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	11	8	%	0,3180000	1	56,7893	11,40	0,5000	56,7893	11,40	0,5000
<b>total:</b>					<b>0,3180000</b>		<b>56,7893</b>			<b>56,7893</b>		

**Source Dispersion by Total Impact Groups**

Records:

"%" - Source considered with exclusion of background;

"+" - Source considered without exclusion of background;

"-" -Source is not considered and its share not included in the background.

(-) marked or unmarked () sources are not considered in the total sum

Source types:

1 - Point;

2 - Linear;

3 - Unorganized;

4 –Unity of point sources for calculation in one plane;

5 –Unorganized with dispersion strength changing over time;

6 –Point sources with umbrella or horizontal dispersion;

7 –Unity of point sources with umbrella or horizontal dispersion;  
8 - Highway.

### Total impact group: 6053

# square	# work shop	# source	Type	Record	Code	dispersion (g/sec)	F	Summer			Winter		
								Cm/MPC	Xm	Um (m/sec)	Cm/MPC	Xm	Um (m/sec)
0	0	1	8	%	0330	0,0060000	1	0,4286	11,40	0,5000	0,4286	11,40	0,5000
0	0	1	8	%	0301	0,3180000	1	56,7893	11,40	0,5000	56,7893	11,40	0,5000
<b>total:</b>						<b>0,3240000</b>		<b>57,2179</b>			<b>57,2179</b>		

### Calculation Completed by Substances (Total Impact Groups)

Code	substance	Maximum Permissible Concentration			Rate of ecologic situation	Background concentration	
		Type	Handbook value	Used in calculation		Records	Interp.
0304	Nitrogen (II) oxide (nitrogenoxide)	max. unit	0,4000000	0,4000000	1	No	No
0328	Black carbon (soot)	max. unit	0,1500000	0,1500000	1	No	No
0330	Sulphur dioxide	max. unit	0,5000000	0,5000000	1	No	No
0337	Carbonoxide	max. unit.	5,0000000	5,0000000	1	No	No
0703	Benzopyrene (3,4-benzopyrene)	MPCaverage daily * 10	0,0000010	0,0000100	1	No	No
1325	Formaldehyde	max. unit	0,0350000	0,0350000	1	No	No
2704	Petrol fraction	max. unit	5,0000000	5,0000000	1	No	No
2732	Paraffin fraction	Orient. safe impact level	1,2000000	1,2000000	1	No	No
0301	Nitrogen dioxide	max. unit	0,2000000	0,2000000	1	No	No
6053	Total impact group (2) 0301 330	Group	-	-	1	No	No

### Sorting of Calculable Meteo-Parameters Automatic Sorting

Wind speed sorting is completed automatically

#### Wind direction

Sector start	Sector end	Wind soring step
0	360	1

### Calculable Area

#### Calculable Squares

#	Type	Full square description				Width (m)	Step (m)		Height (m)	Comment
		Middle point coordinates, I side (m)		Middle point coordinates, II side(m)						
		X	Y	X	Y		X	Y		



1	Given	0	550	1500	550	1100	25	25	2
---	-------	---	-----	------	-----	------	----	----	---

#### Calculable Points

#	Point coordinates (m)		Height (m)	Point type	Comment
	X	Y			
1	558,00	999,00	2	Point at the border with populated area	
2	727,00	654,00	2	Point at the border with populated area	
3	781,00	547,00	2	Point at the border with populated area	
4	926,00	252,00	2	Point at the border with populated area	
5	548,00	825,00	2	Point at the border with populated area	
6	690,00	530,00	2	Point at the border with populated area	
7	866,00	181,00	2	Point at the border with populated area	

#### Calculation Results by Substances (Calculable Points)

Point types:

0 –User calculable point

1 –Point at the border with protection zone

2 –Point at the border with industrial zone

3 –Point at the border with sanitary-protection zone

4 –Point at the border with populated area

5 –At the border of development

#	Coord.X(m)	Coord.Y(m)	Height (m)	Concentration (MPC share)	Wind direction	Wind speed	Background (MPC share)	Background before exclusion	Point type
---	------------	------------	------------	---------------------------	----------------	------------	------------------------	-----------------------------	------------

#### Substance: 0304 Nitrogen (II) Oxide (nitrogenoxide)

7	866	181	2	0,08	1	0,50	0,000	0,000	4
4	926	252	2	0,08	306	0,50	0,000	0,000	4
5	548	825	2	0,08	126	0,50	0,000	0,000	4
1	558	999	2	0,08	181	0,50	0,000	0,000	4
2	727	654	2	0,08	184	0,50	0,000	0,000	4
3	781	547	2	0,08	302	0,50	0,000	0,000	4
6	690	530	2	0,07	120	0,50	0,000	0,000	4

#### Substance: 0328 Black Carbon (Soot)

7	866	181	2	0,03	1	0,50	0,000	0,000	4
4	926	252	2	0,03	306	0,50	0,000	0,000	4
5	548	825	2	0,03	126	0,50	0,000	0,000	4
1	558	999	2	0,03	181	0,50	0,000	0,000	4
2	727	654	2	0,03	184	0,50	0,000	0,000	4
3	781	547	2	0,03	302	0,50	0,000	0,000	4
6	690	530	2	0,03	120	0,50	0,000	0,000	4

#### Substance: 0330 SulphurDioxide

7	866	181	2	7,5e-3	1	0,50	0,000	0,000	4
4	926	252	2	7,5e-3	306	0,50	0,000	0,000	4
5	548	825	2	7,5e-3	126	0,50	0,000	0,000	4

1	558	999	2	7,5e-3	181	0,50	0,000	0,000	4
2	727	654	2	7,4e-3	184	0,50	0,000	0,000	4
3	781	547	2	7,2e-3	302	0,50	0,000	0,000	4
6	690	530	2	6,9e-3	120	0,50	0,000	0,000	4

**Substance: 0337 CarbonOxide**

7	866	181	2	0,09	1	0,50	0,000	0,000	4
4	926	252	2	0,09	306	0,50	0,000	0,000	4
5	548	825	2	0,09	126	0,50	0,000	0,000	4
1	558	999	2	0,09	181	0,50	0,000	0,000	4
2	727	654	2	0,09	184	0,50	0,000	0,000	4
3	781	547	2	0,09	302	0,50	0,000	0,000	4
6	690	530	2	0,08	120	0,50	0,000	0,000	4

**Substance: 0703 Benzopyrene (3,4-benzopyrene)**

7	866	181	2	4,4e-3	1	0,50	0,000	0,000	4
4	926	252	2	4,4e-3	306	0,50	0,000	0,000	4
5	548	825	2	4,4e-3	126	0,50	0,000	0,000	4
1	558	999	2	4,4e-3	181	0,50	0,000	0,000	4
2	727	654	2	4,3e-3	184	0,50	0,000	0,000	4
3	781	547	2	4,2e-3	302	0,50	0,000	0,000	4
6	690	530	2	4,0e-3	120	0,50	0,000	0,000	4

**Substance: 1325 Formaldehyde**

7	866	181	2	0,02	1	0,50	0,000	0,000	4
4	926	252	2	0,02	306	0,50	0,000	0,000	4
5	548	825	2	0,02	126	0,50	0,000	0,000	4
1	558	999	2	0,02	181	0,50	0,000	0,000	4
2	727	654	2	0,02	184	0,50	0,000	0,000	4
3	781	547	2	0,02	302	0,50	0,000	0,000	4
6	690	530	2	0,01	120	0,50	0,000	0,000	4

**Substance: 2704 Petrol Fraction**

7	866	181	2	0,07	1	0,50	0,000	0,000	4
4	926	252	2	0,07	306	0,50	0,000	0,000	4
5	548	825	2	0,07	126	0,50	0,000	0,000	4
1	558	999	2	0,07	181	0,50	0,000	0,000	4
2	727	654	2	0,07	184	0,50	0,000	0,000	4
3	781	547	2	0,07	302	0,50	0,000	0,000	4
6	690	530	2	0,07	120	0,50	0,000	0,000	4

**Substance: 2732 Paraffin Fraction**

7	866	181	2	0,07	1	0,50	0,000	0,000	4
4	926	252	2	0,07	306	0,50	0,000	0,000	4
5	548	825	2	0,07	126	0,50	0,000	0,000	4
1	558	999	2	0,07	181	0,50	0,000	0,000	4
2	727	654	2	0,07	184	0,50	0,000	0,000	4
3	781	547	2	0,07	302	0,50	0,000	0,000	4
6	690	530	2	0,07	120	0,50	0,000	0,000	4

**Substance: 0301 NitrogenDioxide**

7	866	181	2	1,00	1	0,50	0,000	0,000	4
4	926	252	2	1,00	306	0,50	0,000	0,000	4
5	548	825	2	0,99	126	0,50	0,000	0,000	4
1	558	999	2	0,99	181	0,50	0,000	0,000	4
2	727	654	2	0,98	184	0,50	0,000	0,000	4
3	781	547	2	0,95	302	0,50	0,000	0,000	4
6	690	530	2	0,91	120	0,50	0,000	0,000	4

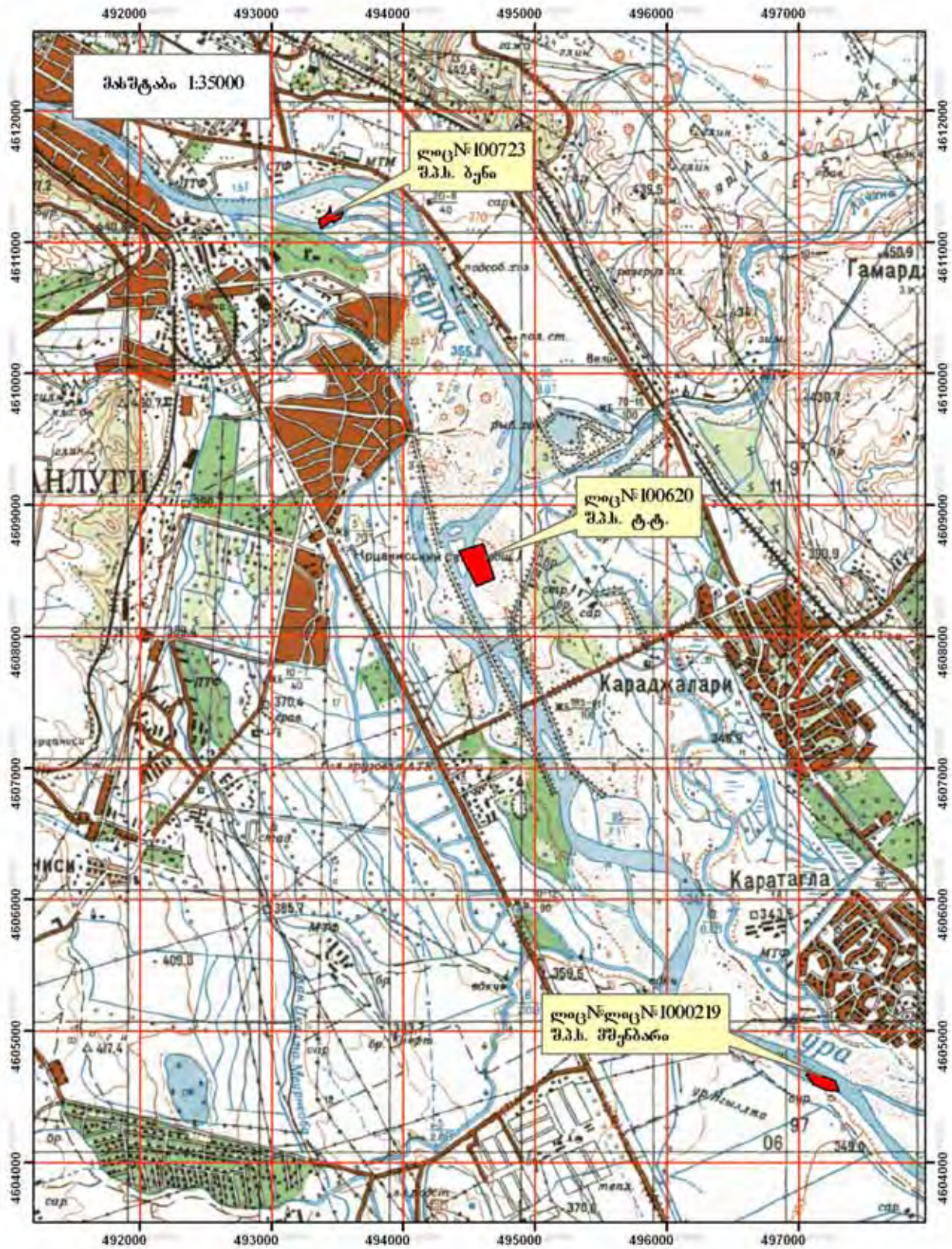
**Substance: 6053 Total Impact Group (2) 0301 330**

7	866	181	2	0,63	1	0,50	0,000	0,000	4
4	926	252	2	0,63	306	0,50	0,000	0,000	4
5	548	825	2	0,63	126	0,50	0,000	0,000	4
1	558	999	2	0,62	181	0,50	0,000	0,000	4
2	727	654	2	0,61	184	0,50	0,000	0,000	4
3	781	547	2	0,60	302	0,50	0,000	0,000	4
6	690	530	2	0,57	120	0,50	0,000	0,000	4

## **ANNEX 4.**

### **LICENSED QUARRIES IN PROJECT AREA**





**License No. 100620**

Brief geo-information package

Position	Information question list																					
<u>1</u>	<b>Ore recovery object</b> - Karajalari sand and gravel manifestation																					
<u>2</u>	<b>Location of the ore recovery object and general description of the area</b>																					
2.1	<b>Region</b> - Kvemo Kartli																					
2.2	<b>Administrative district</b> - Gardabani																					
2.3	<b>The nearest settled area</b> - Village Karajalari																					
2.4	<b>Distance from an important point</b> - 6-8 km north-west of the city of Rustavi and 2 km in the same direction from village Karajalari																					
2.5	<b>Distance from the nearest road axis</b> - 850-865 m north-east (the nearest distance)																					
2.6	<b>Distance from the state border and coastline</b> - 30-31 km north-west of the state border (the nearest distance)																					
2.7	<b>Distance from the nearest bridge</b> -																					
2.8	<b>River basin and mountain system</b> - the river Mtkvari basin																					
2.9	<b>Nomenclature of the ore recovery object K-38-90-B-6 and linear coordinates</b> - the coordinates of the tops of the object angles are fixed and plotted on a topographic map scaled 1:10000 by LEPL National Environmental Agency. <div><table><tr><td>No.</td><td>X</td><td>Y</td></tr><tr><td>1</td><td>494419</td><td>4608648</td></tr><tr><td>2</td><td>494604</td><td>4608708</td></tr><tr><td>3</td><td>494688</td><td>4608440</td></tr><tr><td>4</td><td>494554</td><td>4608385</td></tr><tr><td colspan="3">S=4,86 ha</td></tr><tr><td colspan="3">WGS 1984</td></tr></table></div>	No.	X	Y	1	494419	4608648	2	494604	4608708	3	494688	4608440	4	494554	4608385	S=4,86 ha			WGS 1984		
No.	X	Y																				
1	494419	4608648																				
2	494604	4608708																				
3	494688	4608440																				
4	494554	4608385																				
S=4,86 ha																						
WGS 1984																						
2.10	<b>Absolute height of the ore recovery object from sea level</b> 350-355 m.																					
2.11	<b>Climatic conditions</b> - moderately humid, Continental.																					
2.12	<b>Traditional industrial branches</b> - agriculture																					
2.13	<b>Drinking and technical water</b> - drinking water is supplied from the village water-supply system and the technical water is supplied from the river Mtkvari.																					
<u>3</u>	<b>Forest resources</b>																					
3.1	<b>Regional forest department</b> - not fixed																					
3.2	<b>Resort zone forest</b> - not fixed																					
3.3	<b>Green zone forest</b> - not fixed																					
3.4	<b>State protection forest zone</b> - not fixed																					
3.5	<b>Floodplain forest</b> - not fixed																					
3.6	<b>A 300-m-wide forest area adjacent to the subalpine zone</b> - not fixed																					
3.7	<b>Up to 100-ha forest area between deforested areas</b> - not fixed																					
3.8	<b>Category of the protected areas of the state forest fund</b> - not fixed																					
3.9	<b>Up to 200-m-wide forest band along the permanent beds of snow avalanches or mudflows</b> - not fixed																					
3.10	<b>A forest area with Red-listed woody plants, as well forest areas with special</b>																					

	<b>economic designation (forest seed production, honey-producing plant growing, etc.) - not fixed</b>
<b>3.11</b>	<b>Forest area in 1 km radius of holiday inns, boarding houses or medicinal establishments or mineral springs (the distance is limited to a watershed) - not fixed</b>
<b>3.12</b>	<b>Up to 300-m-wide coast-protection forest area along the rivers, lakes, water reservoirs and water channels (beds) - not fixed</b>
<b>3.13</b>	<b>Up to 100-m-wide forest band near the escarps, landslid sites, taluses, karst formations and mountain mother rocks outcropping areas on the ground - not fixed</b>
<b>3.14</b>	<b>Up to 100-m-wide forest band along the railways and motor roads (from their subgrades) - not fixed</b>
<b>3.15</b>	<b>The territory where the forest exploitation is envisaged for recreational purposes - not fixed</b>
<b>3.16</b>	<b>Slopes with over 20° inclination - not fixed</b>
<b>3.17</b>	<b>State forest fund area with over 50 m<sup>3</sup> woody resources per ha - not fixed</b>
<b>3.18</b>	<b>State forest fund area with the unconvertible natural forest regeneration process - not fixed</b>
<b>3.19</b>	<b>State forest fund area with over 50% of its area covered with bushes - not fixed</b>
<b>3.20</b>	<b>State forest fund area with the special timber producing license or special hunting industry license or forest exploitation general license issued - not fixed</b>
<b>3.21</b>	<b>Forest station (a former forest unit), ranger's unit number - not fixed</b>
<b>3.22</b>	<b>Quarter(s) No. - not fixed</b>
<b>3.23</b>	<b>Liter(s) No. - not fixed</b>
<b>3.24</b>	<b>Total area of liter(s) - not fixed</b>
<b>3.25</b>	<b>areas covered with forest among them (ha) - not fixed</b>
<b>3.26</b>	<b>areas not covered with forest among them (ha) - not fixed</b>
<b>3.27</b>	<b>Dominant species - not fixed</b>
<b>3.28</b>	<b>Volume and species of erected trees and forest on the sample area - not fixed</b>
<b>3.29</b>	<b>Additional data about forest resources</b>
<b>4</b>	<b>Geological position of the ore recovery object</b>
<b>4.1</b>	<b>Geology of the ore-bearing area</b> - folded system of the Lesser Caucasioni; Aspindza-Tbilisi sector of the southern sub-zone of Ajara-Trialeti zone. The geological description is given similar to the near Lochino II manifestation. The site of manifestation is built with the Tertiary and Quaternary deposits.
<b>4.2</b>	<b>Ore-bearing capacity</b> - both sites of ore manifestation are located 1,5-2 km south-west of village Karajalari. The license areas cover the floodplain terrace of the river Mtkvari. Inert material is presented by sand, gravel and blocks with sandy clay interlayers. Sand comes with different granularity and is of a grey or yellowish grey color. It is made up mostly of the fragments of sedimentary rocks and rarely of volcanogenic rocks. In a petrographic respect, the inert material is made up of sandstones, limestones, porphyries, andesites, basalts and rarely of granitoides, quartz and silicificated rocks. The sand-and-gravel material is well-processed and classified.
<b>4.3</b>	<b>The direction and sloping of the prevalence of the ore-bearing body (bodies) (to the degree of study)</b> - the prevalence of the productive layer is limited by the parameters of the license area.
<b>4.4</b>	<b>Average strength of the ore-bearing body (bodies)</b> - under Resolution No. 120 of June 16 of 2007 of the Georgian government, on the sand-and-gravel deposits and



	<p>manifestations on the rivers, with the geological data about which obtained at the state expenses and stored with LEPL National Environmental Agency, the license to treat the ore deposit is issued with the right to treat a 3-meter-high productive layer.</p> <p>Following the above-mentioned, the average strength of the productive layer on the license object is considered to be 3 m.</p>
<b>4.5</b>	<b>Mean deposition element of ore-bearing body (bodies)</b>
<b><u>5</u></b>	<b>Degree of study of the ore recovery object and geological-technological description of ore deposit</b>
<b>5.1</b>	<b>Exploration works</b> - not conducted
<b>5.2</b>	<b>Testing</b> - not conducted
<b>5.3</b>	<p><b>Petrographic-mineralogical and granulometric description</b> - by analogy: in a petrographic respect, the inert material is made up of sandstones, limestones, porphyries, andesites, basalts and rarely of granitoides, quartz and silicified rocks.</p> <ul style="list-style-type: none"> <li>- Fraction - 0,5 mm or less (sand) - 25,9% on average</li> <li>- Fraction - 0,5-70 mm (gravel) or less - 50,7% on average</li> <li>- Fraction - 70 mm or more (blocks) - 13%.</li> </ul>
<b>5.4</b>	<b>Chemical composition</b> - not studied
<b>5.5</b>	<p><b>Physical-mechanical properties</b> -</p> <p><u>for gravel and blocks</u></p> <p>volumetric fill weight - 1756-1779 kg/m<sup>3</sup>;</p> <p>content of dusty and clay-like particles - 5,4-9,6%;</p> <p>wearing grade - II – II;</p> <p>crushing grade <math>\Delta p</math>-8 and <math>\Delta p</math>-12;</p> <p>voids - 31,7-32,4 %;</p> <p>content of soft rocks - 2,1-2,3 %;</p> <p>content of plate grains - 2,3-3,1 %.</p> <p><u>for sand</u></p> <p>volumetric fill weight - 1510-1530 kg/m<sup>3</sup>;</p> <p>granularity module - 1,94-2,19 kg/m<sup>3</sup>;</p> <p>content of dusty and clay-like particles - 6,0-11,2%;</p> <p>content of #016 mm sieved grains 21,2-21,6%.</p>
<b>5.6</b>	<b>Hygienic-radiation properties</b> - not studied
<b>5.7</b>	<b>Additional data</b> -
<b><u>6</u></b>	<b>Ore deposits reserves and expected resources</b>
<b>6.1</b>	<b>Degree (stage) of exploration of the ore recovery object area</b> - stage of exploration
<b>6.2</b>	<b>Ore recovery object area within the reserves calculation contour</b> - the area of the license area is 3,08 ha
<b>6.3</b>	<b>Major parameters of the ore-bearing body</b> - the area of the license area is 30800 m <sup>2</sup> ; and its strength is 3.0 m.
<b>6.4</b>	<b>Reserves calculation method</b> - mean arithmetic
<b>6.5</b>	<p><b>Quantitative indicators of ore deposit according to the categories of reserves and expected resources (A+B+C<sub>1</sub>+C<sub>2</sub> and P)</b> - the expected sand-and-gravel reserves of category P on the license object are:</p> <p>30800 x 3,0 = 92400 m<sup>3</sup>.</p>
<b>6.6</b>	<b>Reserves stability (degree of filling the generated area with material in case of inert material)</b> - the reserves are hypothetical, non-stable and the degree of filling is unknown.



6.7	Reserves of accompanying useful component - not fixed																					
6.8	Field of use of ore deposits - construction works																					
<u>7</u>	Terms of processing of the ore recovery object																					
7.1	Hydrogeological and mining-and-technical terms of treatment of the ore recovery object - favorable																					
7.2	Method of the ore recovery object processing - quarrying. The environmental balance and safety on the object is guaranteed by the licensee.																					
7.3	Topography of the ore recovery object - a topographic plan of the object is to be drafted by the moment of generation																					
<u>8</u>	<div>Establishing the impact of ore deposit extraction in the coastal zones - the license site is located on the left terrace of the river floodplain. Aiming at maintaining the stability of the river banks, we propose an alternative with the following coordinates:</div> <table><tr><td>No.</td><td>X</td><td>Y</td></tr><tr><td>1</td><td>494457</td><td>4608661</td></tr><tr><td>2</td><td>494546</td><td>4608690</td></tr><tr><td>3</td><td>494665</td><td>4608430</td></tr><tr><td>4</td><td>494554</td><td>4608385</td></tr><tr><td colspan="3">S=3,08 ha</td></tr><tr><td colspan="3">WGS 1984</td></tr></table>	No.	X	Y	1	494457	4608661	2	494546	4608690	3	494665	4608430	4	494554	4608385	S=3,08 ha			WGS 1984		
No.	X	Y																				
1	494457	4608661																				
2	494546	4608690																				
3	494665	4608430																				
4	494554	4608385																				
S=3,08 ha																						
WGS 1984																						
8.1	The location of the ore recovery object relative to the zone of strict supervision of the engineering coastal protection - is not located																					
8.2	The location of the ore recovery object relative to the zone of permanent supervision of the engineering coastal protection - is located																					
8.3	Geodynamic state in the ore extraction area: (bank erosion; excess accumulation originated in the bed) - excess accumulation																					
8.4	Morphological and morphometric changes (erosion, excess accumulation) of banks caused by extracting inert material - no changes will occur																					
8.5	Possible negative hydrological phenomena caused by the morphological changes of the banks: washing out and/or flooding of urban, industrial or agrarian areas, their spatial extension parameters - as a result of material extraction, the major part of the river current will start flowing along the left side of the bed thus alleviating the state of the right wrecking bank of the river.																					
8.6	Engineering solution (proposal) to avoid the damage caused by natural disaster - no need																					
8.7	Conclusions and recommendations - extracting the material with the new coordinates will improve the stability of the right river bank																					
<u>9</u>	Fund and printing material used to prepare the information																					
9.1	Author(s) of the geological report (or book): Pantskhava V.																					
9.2	Place (publishing house) and year of the report drafting (publishing) - 1987																					
9.3	Report fund inventory No. - fund no. 17272																					
<u>10</u>	Graphical material from the indicated information source (as required by the licensee)																					
10.1	A schematic geological map of the ore recovery object -																					
10.2	Plan of reserves calculation -																					
10.3	Chief section of the ore recovery object -																					

## Brief geo-information package

Position	Information question list																																																															
<b>1</b>	<b>Ore recovery object</b> - The river Mtkvari sand and gravel manifestation																																																															
<b>2</b>	<b>Location of the ore recovery object and general description of the area</b>																																																															
<b>2.1</b>	<b>Region</b> - Tbilisi																																																															
<b>2.2</b>	<b>Administrative district</b> - Isani-Samgori																																																															
<b>2.3</b>	<b>The nearest settled area</b> - Adjacent to Ponichala																																																															
<b>2.4</b>	<b>Distance from an important point</b> - 11-12 km north-west of the city of Rustavi and 1-1,5 km south-east of Polichala																																																															
<b>2.5</b>	<b>Distance from the nearest road axis</b> - 1280-1500 m east (the nearest distance)																																																															
<b>2.6</b>	<b>Distance from the state border and coastline</b> - 33-34 km north-west of the state border (the nearest distance)																																																															
<b>2.7</b>	<b>Distance from the nearest bridge</b> - 2,6-3,0 km south-east (the nearest distance)																																																															
<b>2.8</b>	<b>River basin and mountain system</b> - the river Mtkvari basin																																																															
<b>2.9</b>	<b>Nomenclature of the ore recovery object K-38-90-Б-6 and linear coordinates</b> - the coordinates of the tops of the object angles are fixed and plotted on a topographic map scaled 1:25000 by LEPL National Environmental Agency. <div><table><tr><th>No.</th><th>X</th><th>Y</th></tr><tr><td colspan="3">I area</td></tr><tr><td>1</td><td>493369</td><td>4611107</td></tr><tr><td>2</td><td>493357</td><td>4611178</td></tr><tr><td>3</td><td>493398</td><td>4611195</td></tr><tr><td>4</td><td>493428</td><td>4611225</td></tr><tr><td>5</td><td>493447</td><td>4611265</td></tr><tr><td>6</td><td>493450</td><td>4611218</td></tr><tr><td>7</td><td>493495</td><td>4611209</td></tr><tr><td>8</td><td>493545</td><td>4611245</td></tr><tr><td>9</td><td>493527</td><td>4611182</td></tr><tr><td>10</td><td>493462</td><td>4611147</td></tr><tr><td>11</td><td>493453</td><td>4611167</td></tr><tr><td>12</td><td>493423</td><td>4611137</td></tr><tr><td colspan="3">S=1,15 ha</td></tr><tr><td colspan="3">II area</td></tr><tr><td>1</td><td>493550</td><td>4611247</td></tr><tr><td>2</td><td>493746</td><td>4611259</td></tr><tr><td>3</td><td>493762</td><td>4611187</td></tr><tr><td colspan="3">S=0,72 ha</td></tr><tr><td colspan="3">WGS 1984</td></tr></table></div>	No.	X	Y	I area			1	493369	4611107	2	493357	4611178	3	493398	4611195	4	493428	4611225	5	493447	4611265	6	493450	4611218	7	493495	4611209	8	493545	4611245	9	493527	4611182	10	493462	4611147	11	493453	4611167	12	493423	4611137	S=1,15 ha			II area			1	493550	4611247	2	493746	4611259	3	493762	4611187	S=0,72 ha			WGS 1984		
No.	X	Y																																																														
I area																																																																
1	493369	4611107																																																														
2	493357	4611178																																																														
3	493398	4611195																																																														
4	493428	4611225																																																														
5	493447	4611265																																																														
6	493450	4611218																																																														
7	493495	4611209																																																														
8	493545	4611245																																																														
9	493527	4611182																																																														
10	493462	4611147																																																														
11	493453	4611167																																																														
12	493423	4611137																																																														
S=1,15 ha																																																																
II area																																																																
1	493550	4611247																																																														
2	493746	4611259																																																														
3	493762	4611187																																																														
S=0,72 ha																																																																
WGS 1984																																																																
<b>2.10</b>	<b>Absolute height of the ore recovery object from sea level</b> 350-353 m.																																																															
<b>2.11</b>	<b>Climatic conditions</b> - Continental.																																																															
<b>2.12</b>	<b>Traditional industrial branches</b> - agriculture																																																															
<b>2.13</b>	<b>Drinking and technical water</b> - drinking water is supplied from the city water-supply system and the technical water is supplied from the river Mtkvari.																																																															

<b>3</b>	<b>Forest resources</b>
<b>3.1</b>	<b>Resort zone forest - not fixed</b>
<b>3.2</b>	<b>Green zone forest - not fixed</b>
<b>3.3</b>	<b>State protection forest zone - not fixed</b>
<b>3.4</b>	<b>Floodplain forest - not fixed</b>
<b>3.5</b>	<b>A 300-m-wide forest area adjacent to the subalpine zone - not fixed</b>
<b>3.6</b>	<b>Up to 100-ha forest area between deforested areas - not fixed</b>
<b>3.7</b>	<b>Category of the protected areas of the state forest fund - not fixed</b>
<b>3.8</b>	<b>Up to 200-m-wide forest band along the permanent beds of snow avalanches or mudflows - not fixed</b>
<b>3.9</b>	<b>A forest area with dominating Red-listed woody plants, as well forest areas with special economic designation (forest seed production, honey-producing plant growing, etc.) - not fixed</b>
<b>3.10</b>	<b>Forest area in 1 km radius of holiday inns, boarding houses or medicinal establishments or mineral springs (the distance is limited to a watershed) - not fixed</b>
<b>3.11</b>	<b>Up to 300-m-wide coast-protection forest area along the rivers, lakes, water reservoirs and water channels (beds) - not fixed</b>
<b>3.12</b>	<b>Up to 100-m-wide forest band near the escarps, landslid sites, taluses, karst formations and mountain mother rocks outcropping areas on the ground - not fixed</b>
<b>3.13</b>	<b>Up to 100-m-wide forest band along the railways and motor roads (from their subgrades) - not fixed</b>
<b>3.14</b>	<b>The territory where the forest exploitation is envisaged for recreational purposes - not fixed</b>
<b>3.15</b>	<b>Slopes with over 20° inclination - not fixed</b>
<b>3.16</b>	<b>State forest fund area with over 50 m<sup>3</sup> woody resources per ha - not fixed</b>
<b>3.17</b>	<b>State forest fund area with the unconvertible natural forest regeneration process - not fixed</b>
<b>3.18</b>	<b>State forest fund area with over 50% of its area covered with bushes - not fixed</b>
<b>3.19</b>	<b>State forest fund area with the special timber producing license or special hunting industry license or forest exploitation general license issued - not fixed</b>
<b>3.20</b>	<b>Regional forest department - not fixed</b>
<b>3.21</b>	<b>Forest station (a former forest unit), ranger's unit number - not fixed</b>
<b>3.22</b>	<b>Quarter(s) No. - not fixed</b>
<b>3.23</b>	<b>Liter(s) No. - not fixed</b>
<b>3.24</b>	<b>Total area of liter(s) - not fixed</b>
<b>3.25</b>	<b>areas covered with forest among them (ha) - not fixed</b>
<b>3.26</b>	<b>areas not covered with forest among them (ha) - not fixed</b>
<b>3.27</b>	<b>Dominant species - not fixed</b>
<b>3.28</b>	<b>Volume and species of erected trees and forest on the sample area - not fixed</b>
<b>3.29</b>	<b>Additional data about forest resources</b>
<b>4</b>	<b>Geological position of the ore recovery object</b>
<b>4.1</b>	<b>Geology of the ore-bearing area - folded system of the Lesser Caucasioni; Aspindza-Tbilisi sector of the southern sub-zone of Ajara-Trialeti zone. The geological description of manifestation is given similar to the near Lochino II sand-and-gravel deposit manifestation.</b>

	The site is built with the sandy and clay deposits of Paleogene system (Eocene section), gypsum clays of Neogene system (Pliocene section) and alluvial deposits of the Quaternary system.
<b>4.2</b>	<b>Ore-bearing capacity</b> - both sites of the license objects are located on the over-floodplain terrace of the river Mtkvari. The useful layer on the territory of the license object is presented by the alluvial deposits of the floodplain and I over-floodplain terraces of the river Mtkvari, in particular, sand, gravel and blocks. The sand comes with different granularity and is of a grey or yellowish grey color. The gravel and blocks are well-processed and come in different shapes. In a petrographic respect, the material is presented by fractions of sedimentary (sandstones, limestones) and volcanogenic rocks (porphyries, andesites, basalts, quartz and silicified rocks).
<b>4.3</b>	<b>The direction and sloping of the prevalence of the ore-bearing body (bodies) (to the degree of study)</b> - the prevalence of the productive layer is limited by the parameters of the license area.
<b>4.4</b>	<b>Average strength of the ore-bearing body (bodies)</b> - under Resolution No. 120 of June 16 of 2007 of the Georgian government, on the sand-and-gravel deposits and manifestations on the rivers, with the geological data about which obtained at the state expenses and stored with LEPL National Environmental Agency, the license to treat the ore deposit is issued with the right to treat a 3-meter-high productive layer. Following the above-mentioned, the average strength of the productive layer on the license object is considered to be 3 m.
<b>4.5</b>	<b>Mean deposition element of ore-bearing body (bodies)</b>
<b><u>5</u></b>	<b>Degree of study of the ore recovery object and geological-technological description of ore deposit</b>
<b>5.1</b>	<b>Exploration works</b> - not conducted
<b>5.2</b>	<b>Testing</b> - not conducted
<b>5.3</b>	<b>Petrographic-mineralogical and granulometric description</b> - by analogy of Lochino II mine: in a petrographic respect, the material is presented by fractions of sedimentary (sandstones, limestones) and volcanogenic rocks (porphyries, andesites, basalts, quartz and silicified rocks). <ul style="list-style-type: none"> <li>- Fraction - 70 mm or more (blocks) - 13,0%.</li> <li>- Fraction - 5-70 mm (gravel) - 50,7%;</li> <li>- Fraction of 5 mm or less (sand) - 25.9%.</li> </ul>
<b>5.4</b>	<b>Chemical composition</b> - not studied
<b>5.5</b>	<b>Physical-mechanical properties</b> - the physical-mechanical properties are given by analogy: volumetric weight of the gravel and blocks fill - 1756-1779 kg/m <sup>3</sup> ; content of dusty and clay-like particles - 5,4-9,6%; crushing grade $\Delta p-8$ and $\Delta p-12$ ; voids - 31,7-32,4 %; content of soft rocks - 2,1-2,3 %; content of plate grains - 2,3-3,1 %. volumetric weight of fill sand - 1510-1530 kg/m <sup>3</sup> ; granularity module - 1,94-2,19 kg/m <sup>3</sup> ; organic admixtures - no;



	content of dust and clay - 6,0-11,2%; content of #016 mm sieved grains 21,2-21,6%.
<b>5.6</b>	<b>Hygienic-radiation properties</b> - not studied
<b>5.7</b>	<b>Additional data</b> -
<b>6</b>	<b>Ore deposits reserves and expected resources</b>
<b>6.1</b>	<b>Degree (stage) of exploration of the ore recovery object area</b> - stage of exploration
<b>6.2</b>	<b>Ore recovery object area within the reserves calculation contour</b> - the area of the license area is 1,15 ha for the I area and it is 0,72 ha for the II area.
<b>6.3</b>	<b>Major parameters of the ore-bearing body</b> - the area of the I area is 11500 m <sup>2</sup> and it is 7200 m <sup>2</sup> for the II area; the average strength is 3.0 m.
<b>6.4</b>	<b>Reserves calculation method</b> - mean arithmetic
<b>6.5</b>	<b>Quantitative indicators of ore deposit according to the categories of reserves and expected resources (A+B+C<sub>1</sub>+C<sub>2</sub> and P)</b> - the expected reserves of category P on the object are: 11500 x 3 = 34500 m <sup>3</sup> for the I area 7200 x 3 = 21600 m <sup>3</sup> for the II area Total of 34500 + 21600 = 56100 m <sup>3</sup> .
<b>6.6</b>	<b>Reserves stability (degree of filling the generated area with material in case of inert material)</b> - the reserves are hypothetical.
<b>6.7</b>	<b>Reserves of accompanying useful component</b> - not fixed
<b>6.8</b>	<b>Field of use of ore deposits</b> - construction works
<b>7</b>	<b>Terms of processing of the ore recovery object</b>
<b>7.1</b>	<b>Hydrogeological and mining-and-technical terms of treatment of the ore recovery object</b> - favorable
<b>7.2</b>	<b>Method of the ore recovery object processing</b> - quarrying. The environmental balance and safety on the object is guaranteed by the licensee.
<b>7.3</b>	<b>Topography of the ore recovery object</b> - a topographic plan of the object is to be drafted by the moment of generation
<b>8</b>	<b>Establishing the impact of ore deposit extraction in the coastal zones</b>
<b>8.1</b>	<b>The location of the ore recovery object relative to the zone of strict supervision of the engineering coastal protection</b> - is not located
<b>8.2</b>	<b>The location of the ore recovery object relative to the zone of permanent supervision of the engineering coastal protection</b> - is located
<b>8.3</b>	<b>Morphological and morphometric changes (erosion, excess accumulation) of banks caused by extracting inert material</b> - no changes will occur
<b>8.4</b>	<b>Possible negative hydrological phenomena caused by the morphological changes of the banks (overflow of the water currents from the floodplain-beds)</b> - not expected
<b>8.5</b>	<b>Washing out and/or flooding of urban, industrial or agrarian areas, their spatial prevalence parameters</b> - will not be caused
<b>8.6</b>	<b>Engineering solution (proposal) to avoid the damage caused by natural disaster</b> - no need
<b>8.7</b>	<b>Conclusions and recommendations</b> - extracting the material is admissible. The issue is to be agreed with the LEPL Tbilisi Architectural Department.
<b>9</b>	<b>Fund and printing material used to prepare the information</b>
<b>9.1</b>	<b>Author(s) of the geological report (or book):</b> Pantskhava V.

<b>9.2</b>	<b>Place (publishing house) and year of the report drafting (publishing) - 1987</b>
<b>9.3</b>	<b>Report fund inventory No. - Inventory No. 1. No. 17272</b>
<b><u>10</u></b>	<b>Graphical material from the indicated information source (as required by the licensee)</b>
<b>10.1</b>	<b>A schematic geological map of the ore recovery object -</b>
<b>10.2</b>	<b>Plan of reserves calculation -</b>
<b>10.3</b>	<b>Chief section of the ore recovery object -</b>

**License No. 1000219**

Brief geo-information package

Position	Information question list																																				
<u>1</u>	Location of the ore recovery object and general description of the area - sand-and-gravel manifestation of village Akhuti																																				
<u>2</u>	Location of the ore recovery object and general description of the area																																				
2.1	Region - Samegrelo-Zemo Svaneti																																				
2.2	Administrative district - Chkhorotsku																																				
2.3	The nearest settled area - village Akhuti																																				
2.4	Distance from an important point - 5-6 km north-east of the regional center Chkhorotsku and 500-600 m west of village Akhuti																																				
2.5	Distance from the nearest road axis - over 100 m																																				
2.6	Distance from the state border and coastline - over 20 km																																				
2.7	Distance from the nearest bridge - 250-260 m southwards																																				
2.8	River basin and mountain system - the river Otskarie																																				
2.9	Nomenclature of the ore recovery object K-38-90-V-v and linear coordinates - the coordinates of the tops of the object angles are fixed and plotted on a topographic map scaled 1:10000 by LEPL National Environmental Agency. <div><table><tr><th>No.</th><th>X</th><th>Y</th></tr><tr><td>1</td><td>265527</td><td>470536</td></tr><tr><td>2</td><td>265536</td><td>4705343</td></tr><tr><td>3</td><td>265526</td><td>4705322</td></tr><tr><td>4</td><td>265510</td><td>4705312</td></tr><tr><td>5</td><td>265488</td><td>4705310</td></tr><tr><td>6</td><td>265471</td><td>4705320</td></tr><tr><td>7</td><td>265460</td><td>4705336</td></tr><tr><td>8</td><td>265485</td><td>4705335</td></tr><tr><td>9</td><td>265503</td><td>4705342</td></tr><tr><td colspan="3">S=0,20 ha</td></tr><tr><td colspan="3">WGS 1984</td></tr></table></div>	No.	X	Y	1	265527	470536	2	265536	4705343	3	265526	4705322	4	265510	4705312	5	265488	4705310	6	265471	4705320	7	265460	4705336	8	265485	4705335	9	265503	4705342	S=0,20 ha			WGS 1984		
No.	X	Y																																			
1	265527	470536																																			
2	265536	4705343																																			
3	265526	4705322																																			
4	265510	4705312																																			
5	265488	4705310																																			
6	265471	4705320																																			
7	265460	4705336																																			
8	265485	4705335																																			
9	265503	4705342																																			
S=0,20 ha																																					
WGS 1984																																					
2.10	Absolute height of the ore recovery object from sea level 160-165 m.																																				
2.11	Climatic conditions - humid, with the average annual temperature of 14-16°C and average annual precipitations of 1500-3000 mm.																																				
2.12	Traditional industrial branches - agriculture																																				
2.13	Drinking and technical water - drinking water is supplied from the near springs and the technical water is supplied from the river Otskarie.																																				
<u>3</u>	Forest resources																																				
3.1	Regional forest department - not fixed																																				
3.2	Category of the protected areas of the state forest fund - not fixed																																				
3.3	Area with special functional designation - not fixed																																				
3.4	State protection forest zone - not fixed																																				
3.5	A forest area with Red-listed woody plants - not fixed																																				

3.6	<b>Slopes with over 20° inclination</b> - not fixed
3.7	<b>State forest fund area with over 50 m3 woody resources per ha</b> - not fixed
3.8	<b>Forest station (a former forest unit), ranger's unit number</b> - not fixed
3.9	<b>Quarter(s) No.</b> - not fixed
3.10	<b>Liter(s) No.</b> - not fixed
3.11	<b>Total area of liter(s)</b> - not fixed
3.12	<b>areas covered with forest (ha)</b> - not fixed
3.13	<b>areas not covered with forest (ha)</b> - not fixed
3.14	<b>Dominant species</b> - not fixed
3.15	<b>Volume and species of erected trees and forest on the sample area</b> - not fixed
3.16	<b>State forest fund area with the special timber producing license or special hunting industry license or forest exploitation general license issued</b> - no information is available
3.17	<b>Additional data about forest resources</b>
<b>4</b>	<b>Geological position of the ore recovery object</b>
4.1	<b>Geology of the ore-bearing area</b> - intermontane area of Trans-Caucasus; Odishi block of western molassa subsidence.
4.2	<b>Ore-bearing capacity</b> - the geology of the manifestation is characterized by the analogy of Chkhorotsku sand-gravel ore deposit. The license object is located in the floodplain-bed of the river Otskarie. The inert material is represented by well-processed sand, gravel and blocks of different shapes.
4.3	<b>The direction and sloping of the prevalence of the ore-bearing body (bodies) (to the degree of study)</b> - the prevalence of the productive layer is limited by the parameters of the license area.
4.4	<b>Average strength of the ore-bearing body (bodies)</b> - under Resolution No. 120 of June 16 of 2007 of the Georgian government, on the sand-and-gravel deposits and manifestations on the rivers, with the geological data about which obtained at the state expenses and stored with LEPL National Environmental Agency, the license to treat the ore deposit is issued with the right to treat a 3-meter-high productive layer. Following the above-mentioned, the average strength of the productive layer on the license object is considered to be 3 m.
4.5	<b>Mean deposition element of ore-bearing body (bodies)</b> - not defined
<b>5</b>	<b>Degree of study of the ore recovery object and geological-technological description of ore deposit</b>
5.1	<b>Exploration works</b> - not conducted
5.2	<b>Testing</b> - not conducted
5.3	<b>Petrographic-mineralogical and granulometric description</b> - by analogy: in a petrographic respect, the material is represented by sandstones, porphyries, tufa-breccias, tufa-conglomerates, andesites, basalts, etc.
5.4	<b>Chemical composition</b> - not determined
5.5	<b>Physical-mechanical properties</b> - not determined
5.6	<b>Hygienic-radiation properties</b> - not determined
5.7	<b>Additional data</b> -
<b>6</b>	<b>Ore deposits reserves and expected resources</b>
6.1	<b>Degree (stage) of exploration of the ore recovery object area</b> - stage of exploration



<b>6.2</b>	<b>Ore recovery object area within the reserves calculation contour</b> - the area of the license area is 0,2 ha
<b>6.3</b>	<b>Major parameters of the ore-bearing body</b> - the strength of the productive layer is 3,0 m and the area of the license object is 0,2 ha.
<b>6.4</b>	<b>Reserves calculation method</b> - mean arithmetic
<b>6.5</b>	<b>Quantitative indicators of ore deposit according to the categories of reserves and expected resources (A+B+C<sub>1</sub>+C<sub>2</sub> and P)</b> - the expected reserves of category P on the object are estimated as follows: 2000 x 3 = 6000 m <sup>3</sup> .
<b>6.6</b>	<b>Reserves stability (degree of filling the generated area with material in case of inert material)</b> - the reserves are hypothetical.
<b>6.7</b>	<b>Reserves of accompanying useful component</b> - not fixed
<b>6.8</b>	<b>Field of use of ore deposits</b> - the sand and gravel of the license object, after washing, can be used for construction works and as concrete filler.
<b>7</b>	<b>Terms of processing of the ore recovery object</b>
<b>7.1</b>	<b>Hydrogeological and mining-and-technical terms of treatment of the ore recovery object</b> - satisfactory
<b>7.2</b>	<b>Method of the ore recovery object processing</b> - quarrying. The environmental balance and safety on the object is guaranteed by the licensee.
<b>7.3</b>	<b>Topography of the ore recovery object</b> - a survey of the object is necessary and the object must be included in the state network.
<b>8</b>	<b>Establishing the impact of ore deposit extraction in the coastal zones</b> - the license object is located in the floodplain-bed of the river
<b>8.1</b>	<b>The location of the ore recovery object relative to the zone of strict supervision of the engineering coastal protection</b> - is located
<b>8.2</b>	<b>The location of the ore recovery object relative to the zone of permanent supervision of the engineering coastal protection</b> - is located
<b>8.3</b>	<b>Geodynamic state in the ore extraction area: (bank erosion; excess accumulation in the bed)</b> - excess accumulation
<b>8.4</b>	<b>Morphological and morphometric changes (erosion, excess accumulation) of banks caused by extracting inert material</b> - no changes will occur
<b>8.5</b>	<b>Possible negative hydrological phenomena caused by the morphological changes of the banks: washing out and/or flooding of urban, industrial or agrarian areas, their spatial extension parameters</b> - as a result of material extraction, the live section of the riverbed will increase improving the hydrological conditions.
<b>8.6</b>	<b>Engineering solution (proposal) to avoid the damage caused by natural disaster</b> - no need
<b>8.7</b>	<b>Conclusions and recommendations</b> - extracting the material in the given area is admissible
<b>9</b>	<b>Fund and printing material used to prepare the information</b>
<b>9.1</b>	<b>Author(s) of the geological report (or book):</b> authors: Mikaia D. et al.
<b>9.2</b>	<b>Place (publishing house) and year of the report drafting (publishing)</b> - "Sakgeologia", 1980
<b>9.3</b>	<b>Report fund inventory No.</b> - fund no. 15314
<b>10</b>	<b>Graphical material from the indicated information source (as required by the licensee)</b>

<b>10.1</b>	<b>A schematic geological map of the ore recovery object -</b>
<b>10.2</b>	<b>Plan of reserves calculation -</b>
<b>10.3</b>	<b>Chief section of the ore recovery object -</b>

## **Procedures for Extraction of Plant Species Included in Red List of Georgia from the Natural Environment and Procedures for Changing Category of Forestry Fund Land**

### **Extraction of Plant Species Included in Red List of Georgia (Endangered) from the Natural Environment**

The law of Georgia on the Red List of Georgia and Red Book identifies the exceptional cases, when plants included in Red List of Georgia could be extracted from the environment, namely:

According to Article 24 – “Extraction of Endangered Wild Plants or their Parts (from the Natural Environment)”:

Extraction of endangered wild plants or their parts (from the natural environment) is allowed only in the below exceptional cases:

- a) Restoration and propagation in natural conditions (cultivation);
- b) Cultivation in dendrological and botanical gardens and parks;
- c) For economic purposes to cultivate in artificial conditions (only if the wild plant is cultivated artificially);
- d) For scientific purposes;
- e) If the damage of the endangered wild plant or its parts is caused by entomic pests and phyto diseases and their presence in natural environment poses the threat of spreading entomic pests/phyto diseases and the extraction from the natural environment is the only means against entomic pests/phyto diseases – in this case the basis of the review of the issue of the extraction (from the natural environment) of the endangered wild plant or its parts by the ministry of the protection of the environment of Georgia is the summary presented to the ministry by the joint commission of public legal entity – Vasil Gulisashvili Institute of Forestry, public legal entity – Levan Kanchaveli Institute of Plant Protection and public legal entity – Tbilisi Botanical Garden and Botanical Institute. Upon the discussion of the summary the ministry is entitled to decide on the extraction of plants from the natural environment;
- f) During the construction of object and infrastructure of special state significance – during the mentioned activities plant species included in the Red List are extracted from the natural environment only if the ministry of the protection of the environment of Georgia decides to extract plant species included in the Red List from the natural environment. The ministry of the protection of the environment could be appealed to make the above decision by ministry determined by the law of Georgia on “the Structure, Incumbency and Rule of Conduct of the Government of Georgia”.

### **Change of Category of Forestry Land**

The rule and procedures of the change of category of state forestry land are implemented according to the rule of conduct approved by the order of the minister of

the protection of the environment and natural resources N5 (15<sup>th</sup> February, 2010) on “the Rule of Assigning Category of Special Purpose to State Forestry Land”.

The above mentioned rule regulates the issues of use of forests for special purpose within the state forestry territory. Territory of state forestry, which is issued into special purpose-specific use, is automatically assigned the category of special purpose of the state forestry.

The decision on the assignment of special forest use right within the state forestry fund as well as special tree felling was made by the ministry of the protection of the environment and natural resources upon agreement with other interested agencies, except for the cases as stipulated by Part 3, Article 33 of the Forest Code of Georgia (on the latter the decision is made by the Government of Georgia, while this part of the Forest Code implies the following: any change, which is aimed at the decrease of the state forest fund, should be well-grounded. In case of special tree felling on slopes of 35 degree or more inclination wood processing is possible only during the construction of object of especial state significance. Wood processing on slopes of inclination from 30 to 35 degree is allowed only after special research and if forest restoration measures are introduced parallel to wood processing). However, after the reorganization of the mentioned ministry this function was assigned to the ministry of energetics and natural resources, in the structure of which forestry agency was included. As respective changes on separation of incumbency have not yet been implemented in the legislation of Georgia, the below mentioned “ministry” and agency responsible for this specific issues presumably imply the ministry of energetics and natural resources.

Forest use with special purpose is implemented for the below purposes:

- a) Construction, reconstruction (rehabilitation) or uninstallation of hydro systems, pipelines, roads, communications and power communications, channels;
- b) During the implementation of anti-fire measures and elimination of results of flood and other extreme situations;
- c) If a threat of restriction of functioning or damage to any infrastructure or its separate elements exists;
- d) During fossil use;
- e) During the reconstruction (rehabilitation) of monument of cultural heritage.

An entity interested in special forest use applies to the appropriate ministry. This ministry sends the application and supplemented documents to the bodies with the right of state forestry management for approval. In case of positive response the ministry sends the full documentation (in cases of activity determined by Sub-Paragraphs “a”, “d” and “e” indicated above) to the ministry of economics and sustainable development of Georgia and ministry of culture and protection of monuments of Georgia for approval and if positive response is given by these ministries, it starts the procedure of the review of the application and relative documentation. Only in cases stipulated by Sub-Paragraphs “b” and “c” the decision is based upon the proposal of the body with the right of state forestry management.

For the assignment of right of special forestry use within the state forestry the application should: in case of activities as stipulated by Sub-Paragraphs “a”, “d” and “e” comply with the requirements identified by Article 78 of the General Administrative Code of Georgia. It should also contain the list of supplemented documents:

1. The motivation of the necessity of special forestry use, its goal and term;



2. For private legal entities and individual entrepreneurs – statement from the register of entrepreneurs and non-profit (non-commercial) legal entities, for physical persons – copy of the personal ID card of Georgian citizen or passport, for public legal entity – authenticated copy of founding documents;
3. Precise measuring drawing of the area selected for special forestry use in UTM coordinate system. The drawing should be authenticated by the executor of the measuring drawing;
4. Copy of the document (if applicable), according to which and proceeding from the determined activity, the implementation of special forestry use is necessary or/and needed;
5. Rationale of the necessity of tree felling;
6. Information on the presence of the species protected by the Red List within the selected area.

In case of the activity identified by above given Sub-Paragraphs “b” and “c” the proposal of the body with forestry management right should be supplemented with the below:

1. Rationale of the necessity of the special forestry use;
2. Rationale of the necessity of tree felling;
3. Information on the presence of the species protected by the Red List within the selected area.

In case of the activity determined by Sub-Paragraph “c” additional information on the number of trees to be felled according to species should be provided, in case of the activity determined by Sub-Paragraph “d” – copy of license of fossil extraction, in case of the activity determined by Sub-Paragraph “e” – consent of the ministry of culture and protection of monuments.

In case of decision on special forestry use within the state forestry respective individual administrative-legal act of the minister is issued. On the bases of this act the body with the right of state forestry management signs special forestry use agreement with the stakeholder (except for cases identified by Sub-Paragraphs “b” and “d”) and delivers the territory selected for special forestry use with the act of delivery-acceptance. In case of the expiry of the term of the agreement (or termination) the forest user returns the territory selected for special forestry use to the incumbent body with the act of delivery-acceptance.

If wood processing is required during special forestry use, the trees to be felled are marked by the stakeholder and assigned by the body with the right of forestry management.

In cases stipulated by Sub-Paragraphs “b” and “c” and after the issuing of the above mentioned act the body with the right of forestry management implements the special forestry use and records the felled arborescent resources and passes them to the public legal entity of the ministry – forestry agency for further realization purpose and with the act of delivery-acceptance. If the special forestry user is the public legal entity of the ministry – forestry agency, it records the felled arborescent resource and implements its realization according to the rules as stipulated by the legislation.

### **Exclusion of Land from Forestry**

Exclusion of land from forestry is conducted according to the resolution of the Government of Georgia (13<sup>th</sup> August, 2010) N240 on “the rule of identification of the state forestry boundary”.

The aim of the rule is to determine legal relationships connected with the identification of the boundaries of the state forestry and it does not spread over the legal relationships connected with the identification of borders of the protected areas of the state forestry.

The borders of state forestry are set by the Government of Georgia through sub-legal normative act, which was proposed in the form of draft resolution of the identification of borders of state forestry by the ministry of the protection of the environment and natural resources of Georgia. However, after the reorganization of the mentioned ministry this function was assigned to the ministry of energetics and natural resources, in the structure of which forestry agency was included. As respective changes on separation of incumbency have not yet been implemented in the legislation of Georgia, the below mentioned “ministry” and agency responsible for this specific issues presumably imply the ministry of energetics and natural resources.

The below are entitled to raise the issue of the increase or decrease of the state forestry before the mentioned ministry:

- a) Ministries identified by the law of Georgia on “the Structure, Incumbency and Rule of Conduct of the Government of Georgia”;
- b) Government of the Autonomous Republics;
- c) Tbilisi City Hall;
- d) State assignee – Governor;
- e) As well as the ministry based upon its own initiative.

The appeal should indicate the need (necessity) of increase or decrease of the state forestry, purpose and supplemented with cadaster measuring drawing (with digital version) of the respective area.

The ministry submits the presented documentation, according to the rule determined by the General Administrative Code of Georgia, for approval to the below agencies:

- a) Ministry of economics and sustainable development of Georgia;
- b) Ministry of culture and protection of monuments of Georgia;
- c) If needed, to other interested administrative body.

After the receipt of consent from the above mentioned administrative bodies the ministry submits the prepared material to the Government of Georgia for decision making.

With the aim of precise identification of the contour of the new border of the state forestry the state body of forestry management facilitates:

- a) Study of the existing information on the state forestry (plan-cartographic and cadaster material, land use plans, existing material of inventory (or forestry arrangement), topographic maps and other documentation which could be used for project preparation);
- b) Request and study of the information related to the border of the adjacent owner (among these – information in Public Register);
- c) Determination or/and specification of the border contour of the territory (line) based upon respective material;
- d) Preparation of all the documentation required for the registration of state forestry in Public Register.

The ministry submits the mentioned documentation to the Government of Georgia for decision making.

After the decision on the identification of border of state forestry is made by the Government of Georgia the ministry submits the corresponding documentation to public legal entity – National Agency of Public Register of the ministry of justice of Georgia for registration purpose in the Public Register.

In addition, the ministry is entitled to appeal to the Government of Georgia on identification of borders of separate areas within the state forestry with the purpose of their further registration in the Public Register.

The border line of the state forestry (contour) should be determined via respective technologies (geo-informational system) and on the basis of ortho-photo-plan and other evidence (in state coordinate system – WGS-84/UTM).

## **Waste Management Plan for Construction Camps and Equipment Yards**

### **General Provisions**

The below plan comprises all kinds of activities, which result in waste production, among these:

- Activities in normal exploitation conditions;
- Activities in abnormal exploitation conditions (i.e. during repair-construction works);
- Activities in case of emergency.

### Goals and Objectives of the Plan

The below waste management plan sets the rules of collection, transporting, allocation, treatment and disposal of different waste in accordance with the provisions of the environmental norms and rules.

Systemic method is used in the process of waste management, namely, it comprises the following key principles:

- Timely measures to avoid waste;
- If possible, facilitation of waste treatment;
- The destruction of waste is the last option.

The waste management is conducted according to the below principles:

- Hierarchy principle in waste management;
- Proximity principle;
- Care commitment;
- Use of BATNEEC principles (the best known technique so far, which is not connected with excessive expenses);
- “The polluter pays” principle.

All of the above principles are discussed below.

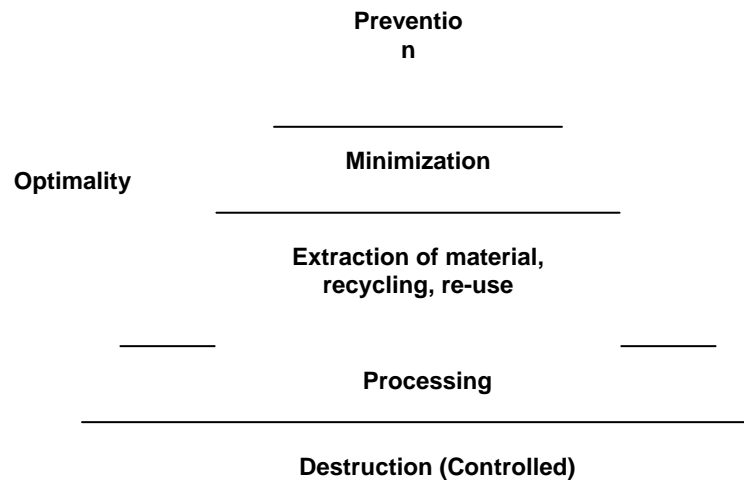
### Hierarchy Principle in Waste Management

Hierarchy principle in waste management illustrated in the below scheme implies the prioritization of various activities during waste management in terms of optimization.

Generally the best option is the prevention of waste, followed by the minimization of the amount and threat. In addition, it is accepted that re-use, restoration and recycling of waste is better and destruction is the last option.

Each waste flow should be processed according to the hierarchy. The selected technique should be the best in terms of threat and practicality.





### **Hierarchy in Waste Management**

#### Proximity Principle

Proximity principle implies waste management be undertaken as near to the source of production as possible.

#### Care Commitment

The implementation of the “care commitment” program is facilitated for all types of waste.

The principle of “care commitment” implies that the person who produced or owns the waste is obliged to facilitate due management of the waste even after the waste is passed to the third party.

Care commitment system categorizes and sets the amount and character of the waste from “cradle to the grave” (i.e. from the production till the processing and final destruction including transportation).

The focus of the principle is on the fact that waste producer should select third party to whom the waste shall be passed with due diligence, evaluate the party’s capacity and control the party’s activities in terms of waste management.

Care commitment requirements are as follows:

- Waste, which is passed to the contractor or carrier for destruction, should have detailed written information on how the waste should be safely transported, processed and destroyed;
- The waste should be passed only to the permitted persons, i.e. registered waste carriers, licensed contractors, waste collectors of the local authorities or persons freed from the licensing obligation;
- Waste should be packaged as necessary, so that it will not spill or leak in the environment;
- All appropriate measures should be introduced, so that all persons who transport or destroy waste follow the requirements of law.

BATNEEC (the best known technique so far, which is not connected with excessive expenses) principle implies waste management be implemented using the best known technique, which is not connected with excessive expenses.

#### *“The Polluter Pays” Principle*

The principle implies that the person who causes the contamination of the environment should indemnify the expenses necessary to eliminate the results of the pollution.

#### *The Main Goals of Waste management Process:*

- Facilitation of the waste identification according to its categories and threats;
- Facilitation of the segregated collection of waste, compliance with the conditions of the temporary disposal to exclude the impact of the waste on the environment and human health;
- Facilitation of the transportation conditions of waste, which should exclude the emission or loss of waste as well as probability of accidents, damage to the environment and human health;
- The use of methods safe to the environment and human health during the treatment, processing or disposal of waste;
- Minimization of the amount of waste;
- Re-use of waste;
- Identification of personal responsibility for waste management;
- Facilitation of the records on industrial and household waste.

The implementation of the instructions given in the plan is compulsory to all employees.

#### *General Requirements of Safe Waste Handling:*

1. The staff involved in waste management (collection, storage, transportation, delivery/receipt) should be trained in occupational health care and safety issues;
2. The staff should be facilitated with special clothes, shoes and individual protection equipment. If required the staff clothes should be specially processed – especially after operations related to the hazardous waste;
3. The staff should be able to provide first aid in case of poisoning or trauma during waste related activities;
4. The people who have not undergone appropriate training, have no special clothes or have signs of sickness should not be allowed to work;
5. Allocation of waste exceeding the set norm in the area of waste collection is not allowed. Allocation of waste near spark or warmth sources is not allowed;
6. In case of allocation of different types of waste their compatibility should be considered;
7. Storage of external items, personal clothes, special clothes, individual protection equipment is not allowed in the areas of industrial waste collection. Eating in such areas is strictly prohibited;
8. Rules of personal hygiene should be strictly followed when working with industrial waste. Before eating and after completion of work hands should be washed with soap and warm water;

9. In case of poisoning signs the work should be terminated and the affected person should address the nearest medical point and inform the management of the structural unit;
10. The areas of collection of flammable waste should be facilitated with firefighting equipment. Smoking and use of open fire is strictly banned in the areas of allocation of such waste;
11. The staff should know the waste characteristics and firefighting rules. The fire extinguishing of burning flammable or fuel liquids is possible with fire extinguishers, sand or asbestos clothes;
12. Fire extinguishing of burning solvents with water is not allowed.

### **Responsibility for the Implementation of Measures Determined by the Plan**

1. Plant management is responsible for the following:
  - Approval of waste inventory charter;
  - Facilitation with the equipment, resources and inventory required for waste management;
  - Protection of the environmental legislation of Georgia in the process of the management of waste produced as a result of the plant activities.
2. Plant staff, who is involved in the waste management field, is responsible for the following:
  - Non-fulfillment of waste collection, storage, transportation and other conditions as stipulated by the waste management plan;
  - Allocation of waste in non-sanctioned places;
  - Violation of norms, rules and records on waste production, processing, use and disposal;
  - Delivery of incomplete incorrect documentation (information) on waste management or refusal to deliver such information;
  - Delivery of waste without duly formalized documentation;
  - Non-fulfillment of the requirements of the waste management plan by the subordinate staff.

### **Procedures and Rules of Waste Management**

This section describes the measures and rules, which should be met (prior to processing and/or destruction) for waste management purposes. Management measures are reviewed according to the below priorities.

#### Waste Classification

Further management of waste significantly depends on the classification of waste at the place of production. Segregation of waste by waste types, meeting the storage requirements and processing/destruction – all of the above requires appropriate classification of waste.

Waste categories should be identified, samples taken, checked, tested or analyzed in laboratory with the aim to facilitate the classification of waste according to EU standards and determine the below issues:

- Which category the waste belongs to – hazardous, non- hazardous or inert;

- How waste management should be implemented.

Person responsible for waste management should facilitate the below for waste classification:

- Use temporary inventory of waste, which should describe wide array of expected types of waste;
- If the specific type of waste is not included in the inventory, use other additional methodology to classify waste;
- If the general methodology of waste classification is not complete, waste samples should be taken and checked in laboratory to facilitate the classification of waste by the below table.

#### **Provisions for Waste Classification**

<b>Waste Classification</b>	<b>Provisions</b>
Inert	According to provisions of article 2 of EU directive 1999/31/EEC, inert waste is the waste which is not subject to significant physical, chemical or biological changes. Inert waste is not resolved, burn or show any other physical or chemical reaction; it does not decompose and negatively impact other matter, with which it interacts; it does not cause the pollution of the environment and damage human health. The contamination effect and eco-toxicity of such waste should be insignificant and will not pose threat to the surface and/or ground water quality.
Hazardous	Hazardous waste is the waste determined by article 1(4) of 91/689 directive and has the following potential characteristics: explosiveness, acidity, high degree of flammability or flammability, irritation causing, toxicity, carcinogenicity, corrosiveness, infectiousness, teratogenesis, mutagenicity; emits very toxic or toxic gases as a result of contact with air, water or acid; substances which could create other substances and eco-toxic substances as a result of destruction.
Non-hazardous	Waste which does not meet the above described provisions.
Waste water	Fresh water which was polluted as a result of project activities.

#### Inventory

After the classification of waste, which should determine the potential threat of the waste, the person responsible for waste management shall develop the inventory list comprising the below information:

- Waste flows and sources;
- Description and classification of waste flows, i.e. if the specific waste is hazardous or not;
- Storage rules, if applicable;
- Destruction methods and contractors;
- Quantitative characteristics of waste – annual, quarterly or monthly, whichever necessary.



Inventory records during annual or other changes are handled by the persons responsible for waste management. The copies of the waste inventory lists are delivered to the plant management. The records are updated only by those persons who have undergone special training in the issue of the use of waste inventory list.

Correct inventory of waste is necessary for the identification of the below issues:

- How the waste should be processed (if applicable);
- How the waste should be handled (i.e. need for personal protection equipment and like);
- How the waste should be stored (if applicable);
- Rule of final processing/destruction.

The aim of the inventory and further measures, among them – labeling, is to provide for the sufficient information and consequently safe final destruction of waste.

### Waste Segregation and Collection

Special containers should be placed in the proximity of the waste producing unit.

Waste should be segregated and allocated in the appropriate container at the waste producing unit.

As a result of the activities at different units waste, which is the subject to registration, collection, temporary storage, carriage, treatment, processing or disposal, is produced and collected.

The method of separated collection of industrial and household waste according to waste categories and threat should be organized and introduced at the object.

The below is the subject to segregated collection and storage:

- Household waste;
- Industrial waste, the carriage of which is not banned on the household grounds (i.e. rubberized asbestos, rubber, plastic household items, wooden and paper waste, wood and sawdust waste, polyethylene pipes, sandpaper waste, etc.);
- Quicksilver containing substances and material;
- Lead containing waste;
- Chemical waste;
- Oily clothes, used respirator filters;
- Oil waste, among these – precipitator waste;
- Used industrial oils, lubricants;
- Material used during the liquidation of oil spills;
- Contaminated soil and sand;
- Metal scraps, welding electrode waste;
- Used rubber hoses, used tires;
- Used lead accumulator waste;
- Paint and paint barrel waste;
- Medical waste.

### Labeling

Persons responsible for waste management are obliged to provide for marking of the waste containers in a way that the contents should be identified and described in detail. The above is necessary for the external staff to follow the safety rules of waste

handling. Waste the type of which is not indicated shall be deemed hazardous and become the subject to the above described classification.

Appropriate labels should be applied to all containers (mugs, wheel boxes, barrels, etc.) so that it is clear which type of waste could be placed in the container. To avoid misunderstanding old labels should be removed.

### Information and Warning Signs





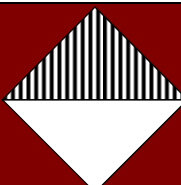

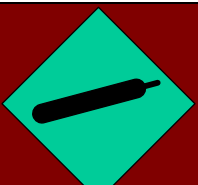






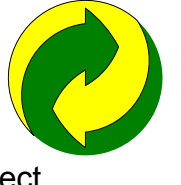


			
Explosive substances or material	Toxic gas or substance	Easily flammable gas and liquid	Easily flammable solid substance
			
Other hazardous substances and material	Spontaneously igniting substance	Non-toxic gas	Hazardous if affected by water
			
Infection threat	Oxidant	Corrosive substance	Radioactive substance
			
Smoking is banned	Subject processing	to For waste household	Flammable

Fig. 7.1

### Waste Storage

The waste should remain on place for minimal period of time and removed as soon as possible for further treatment and destruction.

Waste storage places should be put on the corresponding plan of the object. The waste should be stored in such conditions to avoid the below:

- Accidental leak or spill, surface or ground water contamination, breaking of container due to accidental crash, contact with the air due to utilization of secondary packaging and/or covers;
- Corrosion or depreciation of containers both due to the environment (through provision of shelter) and the waste itself; to provide the above mentioned containers should be proof to the specific waste which should be placed in it, i.e. automobile accumulators should be placed on plastic plates which are corrosion proof;
- Theft due to un-protected allocation of waste within the protected perimeter of the object.

Waste containers should correspond to the waste to be stored, its form, structure and threat. Only containers in good state of repair should be used. Covers should close or other type of covers used. Containers which react to the contents or could result in the leak of the dangerous substance should not be used. All hazardous waste should be strictly segregated from the other types of waste. Only one type of hazardous waste could be placed in a container. Solid and liquid waste should not mix.

The long term collection and storage of waste within the plant is allowed as temporary measure only if:

- Waste is used in the further technological cycle with their full utilization purpose;
- The user does not exist; etc.

Proceeding from the toxic and physical-chemical characteristics of waste and its components temporary storage is allowed in:

- Industrial or auxiliary storages (storage, store-room);
- Temporary non-stationary warehouse;
- Open areas.

The areas of temporary waste storage within the object are identified during the waste inventory process and should comply with the below requirements:

- The ground cover should be solid (concrete, asphalt-concrete or concrete tiles);
- The ground should be fenced and facilitated with ricks to avoid the spill of the harmful substances in rain sewerage or soil;
- The ground should be facilitated with comfortable access for auto-transport;
- The waste should be effectively protected against the impact of precipitations and wind (stalls, packaging, allocation of waste in containers, etc.).

During the temporary storage of waste in non-stationary warehouses and grounds the following conditions should be met: the possibility of waste disposal into the waste water or soil should be eliminated.

Hazardous waste could be stored in stationary warehouse. For this purpose a special warehouse area should be facilitated within the object. The area should be arranged according to the environmental requirements, namely:

- The floor and walls should be covered with ceramic tiles;
- The ceiling should be painted with moisture proof paint;
- The area should be equipped with the below:
  - ✓ Exhaust ventilation system;
  - ✓ Sink and tap for watering-washing of the area;
  - ✓ Water intake drain;
- Iron lattices should be installed on the doors and windows;
- Racks and shelves should be installed for waste allocation;
- Waste could be allocated only in hermetic packaging, which should have appropriate labels.

Removal of hazardous waste from the plant and further management should be undertaken by organization with appropriate permit on this type of activity.

#### Waste Passing Rule

Passing of waste should be formalized through filling in the waste pass form. In each case the below information should be entered:

- Date and time of delivery;
- Description of waste with reference to amount;
- Information on waste producer;
- Information on waste carrier;
- Information on waste recipient;
- Signatures of the representatives of the producer, carrier and recipient.

The filled in form of waste pass should be present along with the carriage overheads from the waste production area or object to the designated place of destruction, that is treatment device of waste waters, landfill, etc.

Each form of waste pass should comprise the full description of waste, structure, production process, packaging, total amount of the passed waste and other relevant information.

Waste pass form should be filled in three copies. The formal procedure of waste pass is as follows:

- Waste pass form is signed by incumbent persons and sub-contractor, who conducts waste removal and carriage;
- The upper copy (first copy) stays at the object and is stored in the archive;
- The below two copies follow the waste till the place of processing, treatment or disposal;
- The carrier is obliged to make the responsible person sign the form at the waste recipient object. It should be indicated that the waste was received in the place of designation;



- After the above procedure the second copy is left at the recipient object;
- The carrier keeps the third copy in the office. Upon the next removal date the carrier should deliver the mentioned third copy to the area of waste production;
- The third copy stays at the waste production area and is stored along with the first copy;
- The photo copy of the third copy is made at the area of waste production. The photo copy is sent to the environmental division within the fulfillment of reporting obligations.

The filled forms of waste pass are stored throughout the entire validity term of the contract.

The responsible person is obliged not to issue and sign the waste pass form, if he/she has sound suspicion that the waste has not reached the designated area in accordance with the applicable rules.

## Waste pass Form

**Table 8.1**

#	Information on waste producer	Information on waste carrier	Information on recipient	waste	Waste composition	Rule/place of production	

#	Type of waste	Amount of waste	The period of waste collection	The number and name of automobile used for transportation	Driver's signature	Time of waste removal from the area of production	The time of waste reception at the place of waste reception	The waste producer's signature	Waste recipient's signature

### Waste Producer Organization

### Waste Recipient Organization

(It is filled in three copies, one stays with the waste producer, the second belongs to the driver and the third – to the waste recipient. After transportation the driver returns his/her copy to the waste producer).

### Waste Transportation

Waste transportation should be conducted in full compliance with the sanitary, environmental and hazardous cargo carriage safety norms. All operations connected with waste loading/unloading and transportation should be maximally mechanized and hermetic.

The loss and dissipation of waste should be avoided during waste transportation. During the transportation of hazardous waste to the temporary storage the accompanying person should have the appropriate document – the request of removal of hazardous waste, which should be verified by plant management. The waste carrier facilitates the transport, loading and transportation of the hazardous waste to the designated area in accordance with sanitary, environmental and safety rules. Upon the completion of the operation the vehicle should be cleaned, washed and treated. The vehicle used for waste transportation should have appropriate warning sign.

Waste which is the subject to secondary processing should be removed from the plant territory by appropriate contractor company on the basis of a contract signed in advance.

Household waste is collected within the plant in special containers, while removal is conducted by the municipal cleaning service on the basis of a contract and according to the determined schedule.

The workers employed in the transportation (drivers and workers) should undergo appropriate training.

The below main risks are connected with cargo transportation:

- Automobile accidents;
- Dissipation or spill of cargo;
- Inappropriate loading of a vehicle.

To avoid the above mentioned the below should be facilitated:

1. The vehicle should be systematically checked in terms of technical state of repair and the traffic speed rules should be met;
2. The hermiticity of containers should be checked;
3. The cargo capacity of the vehicle should be considered during the loading in order to avoid over-loading of the vehicle;
4. Liquid impermeable capacious geo-membrane should be placed on the body of the vehicle. It should facilitate the detention of waste on the body of the vehicle in case of emergency spill.

If an accident still occurs despite the consideration of the above safety measures and the environment is contaminated, then the driver urgently contacts with the object administration, who implements the measures as stipulated by the emergency response plan and with the help of the rescue team.

### Monitoring of Waste Management

During industrial waste collection, storage, transportation, use, treatment and disposal applicable ecological, sanitary-epidemiologic and safety norms and rules should be complied.

The registration of waste production, allocation, treatment and removal is conducted in special journal. The volume of the removed or utilized waste should be confirmed documentarily.

The person responsible for waste management should systematically control the below:

- The adequacy of the waste packaging;
- Presence of labeling on the packaging;

- The state of temporary waste allocation grounds;
- The amount of the collected waste and compliance with the applicable norms (visual control);
- Compliance with the procedure of the waste removal from the territory;
- Fulfillment of the requirements of ecological safety and safety technique.

#### Indicators of Effective Waste Management

As it has been already mentioned, different types of waste could be produced at the object. The applicable waste management rules should be complied to provide for appropriate waste management. The waste removal/disposal should be conducted according to the determined rule and following the applicable norms/rules of Georgia.

Potential Impact	<ul style="list-style-type: none"> <li>• Pollution of the territory due to inappropriate waste management</li> </ul>
Sources	<ul style="list-style-type: none"> <li>• Packaging;</li> <li>• Other construction waste;</li> <li>• Waste collected during land works;</li> <li>• Fuel use and storage;</li> <li>• Repair of the equipment;</li> <li>• Household waste</li> </ul>
Goal	<ul style="list-style-type: none"> <li>• Facilitation of timely removal of waste according to the applicable rule;</li> <li>• Prevention of damage to the environment caused by waste</li> </ul>
Activity/Control	<ul style="list-style-type: none"> <li>• Facilitation of compliance with appropriate legislative and regulative requirements;</li> <li>• Arrangement of special place for temporary waste storage;</li> <li>• Throw of waste according to the applicable legislative requirements;</li> <li>• Separation of hazardous and non-hazardous waste;</li> <li>• Transportation of the household waste to the landfill;</li> <li>• Re-use of waste (if applicable);</li> <li>• The blocking of access and movement roads should be prevented</li> </ul>
Effectiveness Indicator	<ul style="list-style-type: none"> <li>• Absence of grievances;</li> <li>• Absence of waste collected during waste and technical servicing;</li> <li>• Absence of hazardous waste and spill traces (i.e. oil, fuel, etc.)</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Supervision over the allocation-removal procedures of waste;</li> <li>• Regular monitoring of waste collection-removal;</li> <li>• Due registration of records;</li> <li>• Grievance records, if needed – response</li> </ul>
Corrective Activities/Reporting	<ul style="list-style-type: none"> <li>• Corrective measures should be implemented as soon as a problem arises or a grievance is received;</li> <li>• The work managers account for every incompliance/violation of applicable norms;</li> <li>• If needed, the responsible person on the working place informs the management of the cases</li> </ul>
Responsible Person	<ul style="list-style-type: none"> <li>• Executor of works</li> </ul>



Responsibility for Monitoring/Execution	<ul style="list-style-type: none"> <li>• Plant management</li> </ul>
---	--

### **Information on the Waste Produced during Object Exploitation**

The following categories of waste are expected during object exploitation:

- Household waste;
- Office waste (paper, cartridges, bulbs, etc.);
- Packaging (wood, paper, etc.);
- Oil contaminated clothes, filters, absorption pillows;
- Oil contaminated soil;
- Polymer waste;
- Medical waste.

The amount of household waste produced during plant functioning is connected with the staff number. According to the preliminary data, up to 200 people shall be employed. Following the accepted norm, 0.70 m<sup>3</sup> of household waste is produced per employee annually. Proceeding from the above, the amount of household waste per year will be: 0.70 X 200 = 140 m<sup>3</sup>. The installation of closed containers is planned for household waste at the object. The removal of this waste and disposal at the grounds will be conducted on the basis of the contract with the municipal cleaning service.

Oil contaminated mass as well as other hazardous waste shall be temporarily allocated within the plant in accordance with environmental and hygienic requirements and proceeding from the collection passed to the organization with appropriate environmental impact permit for further processing/disposal/treatment.

Wooden packaging material shall be passed to the local population for further re-use.

**The management of waste produced at the object (classification, inventory, segregation, collection, storage, passing and transportation) and monitoring shall be conducted in accordance with the above principles, procedures and rule.**

**Protocols of Public Consultation Meetings**

## **Protocol of public review of the EIA Report of construction of Tbilisi-Ponichala and Ponichala-Rustavi sections of Tbilisi-Rustavi speedway**

**Tbilisi**

**March 1, 2012**

On March 1, 2012, the public review of the draft EIA Report of construction of Tbilisi-Ponichala and Ponichala-Rustavi sections of Tbilisi-Rustavi speedway took place at the office of Municipal Development Fund of Georgia.

The meeting was attended by the:

Representatives of the Georgian Municipal Development Fund:

- Nikoloz Soselia, a specialist of the environmental protection analysis and resettlement department;
- David Baindurashvili, a specialist of the environmental protection analysis and resettlement department;

a representative of the environmental protection consultation fund "World Experience for Georgia"

- Irakli Kaviladze;

a representative of the Spatial Planning and Building Policy Department of the Ministry of Economics and Sustainable Development of Georgia:

- Amiran Katsadze;

as well as NGOs and consulting companies:

- Tamar Gugushvili - Aarhus Centre in Georgia;
- Irine Svanidze - Association "Green Alternative"
- Gia Gvilava - International Transparency Georgia
- Gia Aladashvili - "Information Centre of Social Reforms"
- Zurab Gvelesiani - International Transparency Georgia
- David Khidesheli - MAMISONI LTD.
- Valeri Gelashvili - ENGURI 2006 LTD.
- R. Sharashenidze - VBR LTD.
- Ilgar Abdulaev - AKKORD.

and citizens:

- Tamar Bakhurauli;
- Manon Bokuchava and
- Shakro Mirotadze.

The meeting was opened by the specialist of the environmental protection analysis and resettlement department Nikoloz Soselia, who informed the attendees of the aim of the meeting and presented Mr. Irakli Kaviladze, a representative of the environmental protection consultation fund "World Experience for Georgia" to the public, who informed the public about the EIA and relevant report within the limits of the Project. He noted that when drafting the EIA report, the background status of the physical and social environment of the design section of Tbilisi-Rustavi road was studied. In particular, they studied the atmospheric air quality (pollution with harmful substances, natural radiation background, noise propagation), surface water quality, biodiversity, cultural heritage, social aspects, etc.

By considering the works to be accomplished, the types of expected possible impact, degree of impact and needed mitigation measures were specified. The plans of environmental management and monitoring of the planned actions are drafted.

At last, the reporter communicated about the conclusions developed in the EIA process, in particular:

- The Project has a significant positive social-economic impact evidenced by the guaranteed increased traffic flows (local and transit) at the expense of the road with due carrying capacity;
- The general negative effect of the Project is associated with the impact on private lands and associated property and businesses, loss of property or income along the road for the physical and legal entities. Resettlement and compensations will be accomplished in line with the World Bank rules and Georgian legislation. This question will be discussed in the Resettlement Action Plan in detail, which will be published after the relevant document is drafted. During the document drafting, the consultations with the impacted people will be organized individually and in groups.
- The implementation of the Project is not related to any particular environmental impact and is mostly related to the common factors of construction works, like dust, emissions, noise, etc. what can be mitigated by observing the building rules and taking the measures under the management plan.
- The Project is accomplished on strongly transformed urban landscapes with no protected areas, habitats of ecological value or eco-systems in the impact area. Despite this, a certain amount of trees will be felled (mostly the along-road green space plants). The possibility of damage to individual trees of any red-listed or endangered species (e.g. chestnut trees, Plot's Elm, Aldar pine) is not excluded. After the corridor demarcation by the building contractor, the proper cadastre studies in the corridor, marking the trees to be felled, avoiding the protected species as to the extent possible and accomplishing the procedures envisaged by the Law of Removing the Red-Listed Species from the Natural Environment are necessary. A concrete plan of compensatory planting must be developed and agreed with Tbilisi and Rustavi Municipalities and Ministry of Environmental Protection.

After the presentation of the EIA report, the participants of the public review were given the possibility to express their own opinions and notes. A question about the reasons for the resettlement problem not considered under the EIA report and the population subject to resettlement not informed about the public review was put.

In this respect, I. Kaviladze explained to the author of the question that in connection to the resettlement issues a study is underway and a resettlement action plan is being developed, which will thoroughly cover all questions of resettlement. As soon as the said plan is ready, it will be subject to the public review in line with the requirements of the Asian Bank of Development.

The information about the questions and proposal during the public review is given in the annex.



**Information about the questions and proposal during the public review of the EIA Report of construction of Tbilisi-Ponichala and Ponichala-Rustavi sections of Tbilisi-Rustavi highway**

No.	Authors of questions, notes and proposals	Question	Answer
Notes and proposal during the public review			
1	T. Gugushvili (Aarhus Centre) and I. Svanidze (Green Alternative)	The EIA report was not acceptable for them	<p>The EIA report was not acceptable for them, as it did not cover the resettlement issues. As they explained, EIA should cover the analysis of environmental, social and all expected impacts.</p> <p>The EIA is drafted in the format consistent with the legislation of Georgia (Provision of the Environmental Protection Agency of October 4, 2011) and ADB requirements for Category B projects (Initial Environmental Examination). The resettlement issues are discussed in chapter 5.3 of the document to the extent due for the documents of the given format. In particular, chapter 5.3 (pp. 84-89) considers the abstract of the main data known at the developing stage of EIA report, description of number of the affected legal and physical entities, kind of impact, type of business objects and brief description of the ADB resettlement principles.</p> <p>In addition, the explanation about a separate resettlement action plan being developed to be published and publicly reviewed was made. During the document drafting, the consultations with the impacted people will be organized individually and in groups.</p> <p>At present, the resettlement action plan is being completed and it will be published at the end of March of 2012, and its public review will be presumably held at the beginning of April.</p> <p>As for the EIA/IEE document, its final version shall include the accurate information delivered by the team drafting the resettlement plan as soon as at the current stage.</p>
2	T. Gugushvili (Aarhus Centre) and I. Svanidze (Green Alternative)	Where the information about the public review was published?	Explanation: the information about the planned review was published in the newspaper "The 24 hour" and on Aarhus Centre and MDF web-sites.
3	I. Svanidze (Green Alternative)	The presented EIAs do not consider the alternatives of each section or expected environmental impact assessment, and there is no due calculation or validation.	The modern EIA principles mean considering the meaningful alternatives and not nominal execution of procedures. The EIA contains the explanation about the Project of Tbilisi-Rustavi being divided into 3 sub-sections. At present, an intense study of the alternatives of 2nd section of the road is underway, covering the complex analysis of the existing road corridor and other possible routes (including environmental and resettlement aspects). The

			<p>analysis of alternative routes is paid much attention to in the feasibility study of the mentioned section and EIA.</p> <p>As for section 1 (Tbilisi-Ponichala) and section 3 (Ponichala-Rustavi), the Project envisages the modernization and extension of the existing road and not the construction of new sections, and different routes were not meaningful alternatives for the presented Project.</p> <p>The maps shown in the EIA, clearly show that Tbilisi-Ponichala sections follows a narrow corridor between the river Mtkvari (on its left) and steep mountain slope of Shavnavaba ridge (on its right), where there is no either need, or possibility of any alternative route, as in general, the impact on the environmental and social environment is within the norms or even less than along other sections of the speedway. There is no topographical limitation for the section Ponichala-Rustavi, but any rerouting is associated with penetrating the settled areas thus increasing the impact of resettlement. This is so clearly seen on the maps that needs no special quantitative evaluation. As a rule, the extension of the existing road is a priori associated with less impact on the natural and social environment, and the alternatives are sought in the exceptional case when there are significant limitations (technical or social/environmental). Such an exception is the 2<sup>nd</sup> section of the road (Ponichala section), where the existing road is limited by densely populated areas from its both sides. Despite the above-mentioned and clarity of the issue, the revised IEE of Ponichala-Rustavi section includes expended chapter related to Analysis of Alternatives with additional graphic and quantitative information making the unpromising nature of the search for alternative routes even clearer.</p>
4	I. Svanidze (Green Alternative)	<p>The report says that people not having their plots legalized are not eligible for compensation. This is against the ADB requirements. The report also says that each family will receive 200 GEL for transportation. Which criteria were used to fix this amount?</p>	<p>The report does not contain any information implying that those not having their plots legalized are not eligible for compensation, but on the contrary, paragraph 5.3 clearly says that:</p> <ul style="list-style-type: none"> <li>• All affected people, notwithstanding their legal rights to property, will receive the different aid to reserve their pre-project means of subsistence and living standards.</li> <li>• Those using the land illegally, will not receive the compensation for the loss of land, but they will be compensated for the loss of any other property owned by them on the given land. They will also receive the allowances to maintain or improve their living standards.</li> </ul> <p>In addition, we would like to explain that in line with the ADB</p>

			<p>requirements, those occupying the land illegally (with no registered property right of the land or any other legal basis to recognize the land property right with its further registration), will not receive the compensation for land, but will receive the compensation for the loss of harvest, buildings and premises, trees or source of income.</p> <p><b>The version of the Project presented for the public review (para. 5.3, p. 87. Compensation Legibility) says that:</b></p> <p>“The families subject to physical resettlement will receive monetary aid of 200 Gel per family for transportation (to hire vehicle to transport the family belongings) and monetary aid to restore their income source for 3 months, as the aid rendered to establish oneself at a new location). This amount is the subsistence minimum for 3 months amounting to 1.112 Gel per family.”</p> <p>The said citation was taken from the “Land Acquisition and Resettlement Framework” (2008) agreed and approved with the ADB by MDF. After disclosure of the first draft of IEE in January 2012 and prior to the start up of preparation of the LARP, the mentioned frame documents were updated. The revised document formulates the said clause as follows:</p> <p>“The families subject to physical resettlement will receive additional aid to cover their cost of transportation (311 Gel) and 3 months’ subsistence minimum (3x311 Gel) to help alleviate the transitional period.” The final, corrected version of EIA will accordingly contain this clause.</p> <p>At the same time, we would like to once again underline that this clause talks about the additional aid only, while the compensation itself covers the compensation of the lost property (land, buildings and premises, trees) and one-year harvest of annual plants at the full replacement cost.</p> <p>At last, the cited fragment is taken from the part of paragraph 5.3 of IEE considering the eligibility principles approved for the Project and not about real impacts. The list of real impacts does not include the description of the physical resettlement of the affected families from their place of residence. No such case takes place under the Project.</p> <p>The final EIA variants are attached by the brochures during the</p>
--	--	--	--

			consultations with the population as an annex, which gives a detailed description of resettlement principles agreed with the ADB.
5		<p>A question about the waste was put: Where and how will the waste generated during the work be placed? The EIA states that the waste will be placed at the municipal landfills, while in the current situation it is impossible to meet this requirement, as the existing landfill is already overfilled. In addition, the place and manner of placement of the hazardous waste must be indicated.</p>	<p>The EIA says that there is a decision to close up lagluji landfill and its conservation project will be developed. The conservation needs the covering of the closed landfill with inert fill material. The IEE recommends using the inert material generated during the construction of Tbilisi-Rustavi road for this purpose. This has two kinds of environmental benefits: on the one hand, the need for transporting the inert material from borrow pits to cover the landfill will be reduced and on the other hand, the problem of placement of the construction inert materials will be simply settled.</p> <p>As for the other waste, including domestic, hazardous, etc., according to EIA, such waste shall be placed by licensed companies under the agreement.</p>
6		Was there any study undertaken to specify the need for this road? If yes, what is its effect?	Yes, the study was accomplished at the early stage of the project development and early stages of the project preparation.
7		Why this meeting is not attended by the representatives of the organization working on the resettlement issues?	The meeting is attended by the representatives authorized to give answers about the resettlement issues (Mr. D. Baindurashvili (MDF) and Mr. Avto Okromchedishvili (independent auditor)). At the same time, we would like to underline that the consultations about the resettlement issues with the affected people takes place in another format (individually and in focus groups), while the review of the resettlement action plan documents will be organized at a separate meeting at the end of March/at the beginning of April.



## Protocol

PUBLIC CONSULTATIONS  
9 -March, 2012

### **The Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azrbaijani Border) Road Project** **LARP for Section -1**

#### **Public Consultations for Tbilisi - Phonichala (Isani-Samgori district) population and Business Representatives**

**Brief description:** The Government of Georgia (GOG) has received a loan (USD 85 million) from the Asian Development Bank (ADB) through a Multitranchise Financing Facility (MFF) for implementing the Project-1 titled as the Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azerbaijani Border) Road, under Sustainable Urban Transport Investment Program. The Modernization of existing 17.8km Tbilisi-Rustavi road is divided into 3-sections. Section-1: 3.9km existing road between Tbilisi (Gulua Bridge) and Phonichala settlement (Kvemo Phonichala); Section-2 is 7.1km existing Phonichala road from 3.9km to 11 km and section-3 is 6.8km existing Rustavi road from 11km to 17.8 km. All sections of this project require preparation and implementation of Land Acquisition and Resettlement Plans for providing compensation and resettlement assistance to the affected families/persons for protecting or betterment their socio-economic position in respect of pre-project level. LARP-I prepared for section-1.

The design road portion Tbilisi-Rustavi (part of Tbilisi-Red Bridge (Azerbaijani border highway) links the capital of Georgia with the major industrial and administrative center Rustavi and the district center Gardabani. Designing and constructing of other portions of the road will enable the citizens to travel and commodities to be trafficked on comfortable and modern highway to the capital of Azerbaijan Baku. It also will make more accessible Tbilisi and the Black sea ports of Georgia for population of Azerbaijan.

With about 120,000 inhabitants, Rustavi is the main satellite city of Tbilisi urban area. Therefore, there are numerous trips between Rustavi and Tbilisi given that many Rustavi inhabitants commute on daily basis towards Tbilisi. The existing 2-lanes highway (one in each direction) has not enough capacity to carry the whole traffic entering or exiting Tbilisi at peak hours.

The detail design consultant (CONSULTANT) – “Dohwa” hired by the Municipal Development Fund of Georgia within the frames of the project “**The Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge Road**” has conducted public consultation meetings with affected stakeholders. This meeting related to the **Land Acquisition and Resettlement Action Plan (LARP 1)** was held in the MDF office on 9<sup>th</sup> of March, 2012. The meeting was attended by the local population, business representatives and MDF representatives.

The aim of the stakeholder consultations was to deliver information to interested stakeholders and project affected land owners during the **Resettlement Action Plan** preparation process about the resettlement policy and principles, compensation eligibility and entitlements, complaints and grievance redress mechanism, claims and comments submission form. Information has been provided both verbally and by brief information leaflets.

The information leaflets include information related to the resettlement policy, principles of compensation eligibility and entitlements, also recognition and registration of the ownership rights on non-rightfully owned land according to the Georgian Legislation. This allows timely and full consideration of the opinions and comments around the project expressed by the interested parties. The comments and opinions provided by interested stakeholders during early stage of

public consultation process will be addressed in the final draft of the Land Acquisition and Resettlement Plans (LARPs).

Preparation of LARP should include the following: (I) detailed measurement survey (DMS), (II) evaluation of assets/evaluation of affected land plots, (III) consultations with affected rayons and people, (IV) AP census survey – by 100%, (V) AH socio-economic research. LARP preparation process has covered intensive consultations with interested stakeholders including project affected people.

This LARP-I was prepared by MDF based on detailed design and the requirements of the ADB's Safeguard Policy Statements 2009.

**The meeting was attended by:**

**The implementing agency:**

David Baindurashvili - Municipal Development Fund of Georgia.

Nino Patarashvili - Municipal Development Fund of Georgia.

**The Asian Development Bank (ADB):**

Medgar Chelidze – ADB Resettlement Consultant;

**The Consultants:**

Keti Dgebuadze – Consortium DOHWA Ltd (Korea)/Ltd “Transproeqti” Social/Resettlement Expert, Independent Auditor – Consortium DOHWA Ltd (Korea)/Ltd “Transproeqti”

**Population and Business representatives affected by construction of Tbilisi-Phonichala section of the road** (see attached lists).

**The first part of the presentation** was hosted by Mr. D. Baindurashvili – Municipal development Fund, who informed the public about the Project, institutions implementing and financing the project as well as about Work Timeline of the project.

**The second part of the presentation** were hosted by K. Dgebuadze, Medgar Chelidze and Avto Okromchedlishvili. K.Dgebuadze talked about compensation entitlements and documents for ownership rights, in particular: Land acquisition and resettlement tasks under the project will be implemented according to a compensation and entitlement matrix following the approved land acquisition and resettlement framework in compliance with active Georgian laws and ADB's policy on involuntary resettlement. She also explained Complaints and Grievance Redress Mechanism. A grievance mechanism will be available to allow an AP appealing any disagreeable decision, practice or activity arising from land or other assets compensation.

Mr. Chelidze presented in detail the ADB's Land Acquisition and Resettlement Policy and principles, in particular: land for construction of the new road will be acquired under the active laws in Georgia. However, additional requirements of the ADB will be met to ensure that all affected persons are compensated at the replacement costs and/or receive adequate allowances according to severity of impacts and vulnerability status.

**The presentation was followed by a Q&A session.** The questions and comments of different participating parties were replied by the relevant experts of the project: The questions and answers are given in Table # 1.

**Table # 1**

**Place of event:** Municipal Development Fund of Georgia, (Tbilisi).

**Date and time of event:** March 9, 2012, 15:00 p.m.

**Photos #1,2,3,4,5,6 – Public Consultations in MDF office**



### **Participants:**

1. David Baindurashvili – Municipal development Fund
2. Nino Patarashvili - Municipal development Fund
3. Ketí Dgebuadze –Social/Resettlement Expert of the Consortium “DOHWA”/”Trensproeqti
4. Avto Okromchedlishvili – Consortium “DOHWA”/”Trensproeqti - Auditor/Epriiser
5. Medgar Chelidze – ADB Resettlement Consultant
6. David Gagua – Phonichala local population
7. David Chakhmauri – Ltd “Speroza”
8. Gocha Khitiri – JSC “Visol Petroleum Georgia”
9. Soso Pkhakadze - JSC “Visol Petroleum Georgia”
10. Suren Ivanishvili - Phonichala local population
11. Nugzar Shoshiashvili – Ltd “Supervazitalia”
12. Ilia Berikashvili – Ltd “Gani Group”

13. Goga Kavlashvili – Physical person “Kavlashvili Goga”
14. Nino Lukishvili – Ltd “Maksoil”
15. Nino Makhataidze – Ltd “Lukoil Georgia”
16. Roman Korkotadze – Ltd “PiEm Group”
17. Lali Panchulidze – Ltd “Quta”
18. Shota Ninua – Ltd “Delta-1”
19. Maia Ninua – Ltd “Delta-1”
20. Kekelidze Avtandil – Ltd “Delta-1”
21. Gia Ladashvili – NGO- “Information Center of Social Reforms”

**Question-and-Answer session:**

No.	Question/Comment	Author	Expert comment
1.	The road under the project will be categorised as highway, which means that there will not be opportunity to digress from main road to reach our residual land plot (which have not been acquired under the project) and we have to cover additional distance to reach the right place. In this case the business at the residual land plot losses viability.	David Gagua	<p>The viability of the residual land parcel will be estimated by the independent auditor. In case of residual land parcel is considered unviable, the owner will be asked to make a choice: to get cash compensation for the residual land or to keep the land under the ownership.</p> <p>The auditing company will inform the Municipal Development Fund (MDF) of Georgia about this kind of cases and if it is confirmed that the residual land parcel is unviable, the Government will acquire this residual land parcel according to the market price. Also businesses will be fully compensated according to the ADB requirements.</p>
2.	What is the land compensation price?	Suren Ivanishvili	<p>At present the research/evaluation process of identification of market rate for land compensation is underway taking into account investors and government's interests.</p> <p>At present, costs for Tbilisi-Phonichala section are identified:</p> <p><u>Private land:</u></p> <p>km 0 – 0.5 – 179 GEL/sq.m</p> <p>km 0.5 – 1.0 107 GEL/sq.m</p> <p>km 1.0 – 4.0 64 GEL/sq.m</p> <p><u>Agricultural land:</u></p> <p>km 1.0 – 4.0 54 GEL/sq.m</p> <p>Evaluation methodology implies identification of market price on the basis of real negotiations related to the existing legal documents confirming ownership rights and acquisition of land plots. Final price will be identified when the representative of Municipal Development Fund will come to each affected landowner to sign the contract.</p>



3.	We have the business at the project territory. Part of necessary infrastructure for our business is located at the territory owned by us, but the second part is located at the territory which is not in our ownership. We are interested if the compensation is envisaged for the land parcel which is not in our ownership but our business structures are located at this territory?	David Chakhmauri	<p>Compensation for land plots will be implemented in two cases:</p> <ul style="list-style-type: none"> <li>- In first case – for owners with full registration; and</li> <li>- In second case - for legalizable owners</li> </ul> <p>In case of Non-legalizable land users land compensation will not be provided. Though, according to the requirements of the ADB full compensation for crops, for buildings and businesses will be provided. As regards the infrastructure, it will be relocated and you will be able to use it again: it will be connected with water supply system, sewerage system, gas supply system, etc. In case if it is specific infrastructure – you will be provided with compensation for relocation your infrastructure at new place.</p>
4.	Is the mentioned alignment final or some changes will be envisaged?	Ilia Berikashvili	Changes can be envisaged, but it will be insignificant for main alignment.
5.	As you have mentioned for business losses you will provide cash indemnity of 1 year net income, though I would say that the business is not only income and for launching the business activities certain investments are needed.	Soso Pkhakadze	Under the project for business losses cash indemnity of 1 year net income will be provided. At the same time land plot will be fully acquired under the project according to the owners desire. For buildings/structures losses cash compensation at full replacement costs free of depreciation and transaction will be provided; Also, for equipment installation/deinstallation and transportation expenses special allowances will be provided.
6.	I have land which is rented by Turkish citizens. At present, at the mentioned territory car boxes are located. Few months ago Turkish citizens has left the territory without paying the rental fee. Will be this fee compensated under the project?	Local population	In case when official leasing agreement is available, the leaseholder will receive compensation for 1 year net income and the owner will receive 1 year rental fee as compensation for lost incomes. On the other hand, if the leaseholder has left few months ago it means that at present at the territory owned by you business activities are stopped and the rental contract is not in force. In this case you will be provided with compensation for the land, which will be acquired under the project, also you will be provided with the compensation for trees and existing infrastructure, but you will not be provided with the rent fee of stopped business
7.	In case of negotiations failed related with price, what will be the next stage?	Lali Panchulidze	In case, there remains further dispute related to ownership, the case may be referred to the Rayon court and conclusion regarding ownership right will be made according to the court decision. But, before the court it can be solved by negotiations. At the information booklets you can find Claims and Comments Submission Forms.

თბილისი-რუსთავის ჩქაროსნულის საავტომობილო გზის თბილისი-ვოინიჭალის მონაკვეთის  
გზინაგებობის პროექტის ფარგლებში მოსალოდნელი განსახლების საკონსულტაციო  
შემდგომი დამსწრეთა სია

№	სახელი, გვარი	ორგანიზაცია	საკონტაქტო ინფორმაცია (მობილური, email)
1.	დათო გუგუ-	კეძი პარიზი	599 54-98-04
2.	ლევან ჩხეიძე	შპს "სენიტი"	599 58 2912
3.	ზოსტადი	სს "დონეწეწილი ტრასა"	5-77-12-10-10
4.	სანი ფიჭუაძე	სს "დონეწეწილი ტრასა"	5-77-58-80-40
5.	ლუკაშვილი ივანე	კეძი პარიზი	599 91 72 92
6.	ნუგუზაშვილი შალვა	შპს "სენიტი"	599 57 53 53
7.	ილია ჩხეიძე	შპს "სენიტი"	577-78-12-99
8.	ყაზარაძე	სს "დონეწეწილი ტრასა"	593-75-25-25
9.	ნინო მჭედლი	სს "სენიტი"	599 16 45 96
10.	სანი ჩხეიძე	სს "სენიტი"	577 27 27 79
11.	ნინო მჭედლი	სს "სენიტი"	599 50 83 22
			599 50 21 12

12.	հոռիկ հանդիման մոտիվ	Դ.Ն.Ն. Ն. Ն. Ն. Ն.	598 445 411 599 569 282
13.	ԸՊՈ հանձնարար հանձնարար	Դ.Ն.Ն. Ն. Ն. Ն. Դ.Ն.Ն. Ն. Ն. Ն.	5-99-56-20-43
14.	Գրքի մաս	Դ.Ն.Ն. Ն. Ն. Ն.	
15.	Գրքի մաս	Դ.Ն.Ն. Ն. Ն. Ն.	
16.	Հանձնարար Հանձնարար	Դ.Ն.Ն. Ն. Ն. Ն. Դ.Ն.Ն. Ն. Ն. Ն.	
17.	Հանձնարար	Դ.Ն.Ն. Ն. Ն. Ն.	899 979 748
18.	Հանձնարար	Դ.Ն.Ն. Ն. Ն. Ն.	5-99-34-53-83
19.			
20.			
21.			
22.			
23.			
24.			



თბილისი-რუსთავის გზის მშენებლობის პროექტი

Tbilisi-Rustavi Road Construction Project






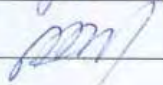
საჯარო კონსულტაციები განსახლების საკითხებზე /Public  
Consultations on Resettlement Issues

საჯარო კონსულტაციებზე მოსაწვევების და საინფორმაციო ბროშურის მიღებაზე  
ხელისმომწერთა სია / Acceptance of Invitation for Public Consultations and Information  
Leaflets

9 მარტი, 2012 / 9 of March 2012

№	სახელი, გვარი/Name	რაიონი, სოფელი/ Region, village	ტელ/მობ: Tel/Mob:	ხელმოწერა/ Signature
1.	ყაჯაშვილი ვიქტორ	საბურთალოს რაიონი 3	593-752825	
2.	ბერიძე დავით	ბორჯომი 6	574 33 12 22	
3.	შალვაძე ვიქტორ	ყაზბეგის რაიონი 24/2	571-00-00-00 05-00-00-00	
4.	ჭიჭინაძე ზაქარია/ვანი	ჭავჭავაძის რაიონი 2/8	54 03 33 (899)	
5.	ივანიშვილი სერგეი	ყაზბეგის რაიონი	595-91-72 96	
6.	ბერიძე დავით	ბურჯანაძის რაიონი 1/1	595-28-00-83	
7.	ჭიჭინაძე თეიმურაზ	კარაი 1 ავტო	599 76 80 10	
8.	ჭიჭინაძე დავით	საბურთალოს რაიონი 1	593 853 0110	
9.	ბერიძე დავით	ბორჯომი 5	595-76 23 22	
10.	ბერიძე დავით	ბურჯანაძის რაიონი 2	595-13-15-85	
11.	ბერიძე დავით	ბურჯანაძის რაიონი 3	598 445 411	
12.	ბერიძე დავით	ბურჯანაძის რაიონი 5	577-407043	
13.	ბერიძე დავით	ბურჯანაძის რაიონი 4/5	599-562043	
14.	ბერიძე დავით	ბურჯანაძის რაიონი 5	577-272979	
15.	ბერიძე დავით	ბურჯანაძის რაიონი 5	595-750535	
16.	ბერიძე დავით	ბურჯანაძის რაიონი 4	599 549 804	



17	սոսիս անձնի խմբ		538 57 5987	
18	զոնայի շնորհ Լուսինա	հայկաշն	555-527275	3. 
19	Նանդա Նոթան Տոսար	Յոյն ցնձաւ 433	577-105535	2. 
20	հիւսնայ; ցնցնայ -	մեծնայ 20	599-97-58-97	
21	Օհրմ 5-25600	Նոկոթմ յոնոնայ	5-77-381027	 07.03.12
22	Յոնոնայ ցնցնայ		599571317	
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				

## Protocol

PUBLIC CONSULTATIONS  
15-20 -December, 2011

### **The Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azrbaijani Border) Road Project**

#### **Public Consultations in Gardabani rayon and in the city of Rustavi**

**Brief description:** The Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge (Azrbaijani Border) Road Project is implementing by Municipal Development Fund of Georgia. Project is financed by the Asian Development Bank (ADB).

The design road portion Tbilisi-Rustavi (part of Tbilisi-Red Bridge (Azerbaijani border highway) links the capital of Georgia with the major industrial and administrative center Rustavi and the district center Gardabani. Designing and constructing of other portions of the road will enable the citizens to travel and commodities to be trafficked on comfortable and modern highway to the capital of Azerbaijan Baku. It also will make more accessible Tbilisi and the Black sea ports of Georgia for population of Azerbaijan.

With about 120,000 inhabitants, Rustavi is the main satellite city of Tbilisi urban area. Therefore, there are numerous trips between Rustavi and Tbilisi given that many Rustavi inhabitants commute on daily basis towards Tbilisi. The existing 2-lanes highway (one in each direction) has not enough capacity to carry the whole traffic entering or exiting Tbilisi at peak hours. In this context, the Georgian Road Department has decided to improve the capacity of Tbilisi – Rustavi link by upgrading the road into a full-grade separated freeway.

The detail design consultant (CONSULTANT) – “Dohwa” hired by the Municipal Development Fund of Georgia within the frames of the project “**The Modernization of Tbilisi-Rustavi Section of the Tbilisi-Red Bridge Road**” has conducted public hearing meetings related to the ***Preliminary Resettlement Study (Due Diligence Report)*** in the Gardabani district and the City of Rustavi on 15<sup>th</sup> and 20<sup>th</sup> of December, 2011, which were attended by the local population and representatives of the local authorities.

The aim of the public hearings was to deliver information to interested stakeholders and project affected land owners during the ***Preliminary Resettlement Study (Due Diligence Report)*** preparation process about the resettlement policy and principles, compensation eligibility and entitlements, complaints and grievance redress mechanism, claims and comments submission form. Information has been provided both verbally and by brief information leaflets.

The information leaflets include information related to the resettlement policy, principles of compensation eligibility and entitlements, also recognition and registration of the ownership rights on non-rightfully owned land according to the Georgian Legislation. This allows timely and full consideration of the opinions and comments around the project expressed by the interested parties. The comments and opinions provided by interested stakeholders during early stage of public consultation process will be addressed in the final draft of the Land Acquisition and Resettlement Plans (LARPs).

Preparation of LARP should include the following: (I) detailed measurement survey (DMS), (II) evaluation of assets/evaluation of affected land plots, (III) consultations with affected rayons and people, (IV) AP census survey – by 100%, (V) AH socio-economic research. LARP

preparation process has covered intensive consultations with interested stakeholders including project affected people.

After preparation of LARPs (LARP1 and LARP2) for sections Tbilisi-Ponichala and Ponichala – Rustavi of the Project, the mentioned documents will be disclosed publicly and public consultations will be conducted. During the LARP preparation process consultation meetings will be conducted with all project affected families.

The project will be implemented according to the Social and Environmental Policies of the ADB and Georgian legislation.

**The meeting was attended by:**

Medgar Chelidze – ADB Resettlement Consultant; Ketil Dgebuadze – Ltd. “WEG” Social/Resettlement Expert, Nurul Hoque – Ltd. “Dohwa” International Resettlement Expert, Avto Okromchedlishvili – Representative of Audit Company “Atos” hired by the “Dohwa” Ltd.

**The meeting was also attended by:** the representatives of Governor's Office of Rustavi city, Rustavi City Hall representatives and the local population (see attached lists).

**The first part of the presentation** was hosted by Mr. G. Kobiashvili – Deputy Governor, who informed the public about the Project, institutions implementing and financing the project as well as about Work Timeline of the project.

**The second part of the presentation** were hosted by ADB Resettlement Consultant - Medgar Chelidze and representative of Audit Company “Atos”- Avto Okromchedlishvili. Mr. Chelidze presented the ADB's Land Acquisition and Resettlement Policy and principles, in particular: land for construction of the new road will be acquired under the active laws in Georgia. However, additional requirements of the ADB will be met to ensure that all affected persons are compensated at the replacement costs and/or receive adequate allowances according to severity of impacts and vulnerability status. Experts also talked about compensation entitlements and documents for ownership rights, in particular: Land acquisition and resettlement tasks under the project will be implemented according to a compensation and entitlement matrix following the approved land acquisition and resettlement framework in compliance with active Georgian laws and ADB's policy on involuntary resettlement.

Experts also talked about Complaints and Grievance Redress Mechanism. A grievance mechanism will be available to allow an AP appealing any disagreeable decision, practice or activity arising from land or other assets compensation.

**The presentation was followed by a Q&A session.** The questions and comments of different participating parties were replied by the relevant experts of the project: The questions and answers are given in Tables # 1, 2.

**Table # 1**

**Place of event:** Gardabani District.

**Date and time of event:** December 15, 2011, 12:00 a.m.

**Photos #1,2,3 – Public Consultations in Gardabani District**



**Participants:**

1. Deputy Gamgebeli
2. Medgar Chelidze – ADB Resettlement Consultant
3. Ketil Dgebuadze – Ltd. “WEG” Social/Resettlement Expert
4. Nurul Hoque – International Expert of Ltd “Dohwa”
5. Avto Okromchedlishvili – Ltd. “Atos”, Auditor/Epriiser
- 6. Nizami Bairamov - Local Population**
- 5. Namaz Mamedov - Local Population**
- 6. Sujadin Alieva - Local Population**
- 7. Salhadin Fashev - Local Population**
- 8. Nazim Phashev - Local Population**
- 9. Rasim Abdulaev - Local Population**
- 10. Solmaz Aliev - Local Population**
- 11. Pharmani - Local Population**

See attached – List of participants of Public Hearings.



**Question-and-Answer session:**

<b>No.</b>	<b>Question/Comment</b>	<b>Author</b>	<b>Expert comment</b>
1.	When the construction of road will start?	Local Population	<p>The construction of road will start in Summer of 2012.</p> <p>The process of Resettlement and compensation will start in Spring of 2012.</p>
2.	What is the land compensation price?	Local Population	<p>At present the research/evaluation process of identification of market rate for land compensation is underway taking into account investors and government's interests. Evaluation methodology implies identification of market price on the basis of real negotiations related to the existing legal documents confirming ownership rights and acquisition of land plots. Final price will be identified when the representative of Municipal Development Fund will come to each affected landowner to sign the contract.</p>
3.	In case when only part of the whole land parcel is affected, is the residual land parcel subject for compensation?	Local population	<p>The viability of the residual land parcel will be estimated by the independent auditor. In case of residual land parcel is considered unviable, the owner will be asked to make a choice: to get cash compensation for the residual land or to keep the land under the ownership.</p> <p>The auditing company will inform the Municipal Development Fund (MDF) of Georgia about this kind of cases and if it is confirmed that the residual land parcel is unviable, the Government will acquire this residual land parcel.</p> <p>Compensation for land is restricted and is possible only in that case when there is a land available in reserve.</p>
4.	What are the categories of the land parcels?	Local population	<p>There are several categories, in particular: agricultural land, non-agricultural land, cropland, grazing land and hay land. The issue of irrigation also will be taken into account, etc. The prices of the land will be classified according to the categories of the land.</p>
5.	If AP would not like to sell the land plot what will happen in this case?	Local population	<p>There is Eminent Domain Law in place, according to this law, based on court decision, the landowner will receive fair compensation and land will become property of State in accordance with expropriation rules defined in Eminent Domain Law. AP may request allocation of similar land plot instead of getting cash</p>

			compensation (if it is possible).
6.	How the long-term trees/plants will be compensated?	Local population	Compensation value of long-term trees/plants will be defined according to the cash compensation at market rate on the basis of type, age and productive value of the trees.

**Table # 2**

**Place of event:** City of Rustavi, Governor's Office.

**Date and time of event:** December 20, 2011, 11:00 a.m.

**Photos #1,2,3 – Public Consultations in Rustavi**



**Participants:**

1. G. Kobiashvili - Depury Governor of Rustavi
2. D. Japaridze – Vice-Mayor of City Rustavi
3. Medgar Chelidze – ADB Resettlement Consultant
4. Ketu Dgebuadze – Ltd. “WEG” Social/Resettlement Expert
5. Nurul Hoque – International Expert of Ltd “Dohwa”
6. Avto Okromchedlishvili – Ltd. “Atos”, Auditor/Epriiser
7. Representatives of local population – 37 people (See Annex #2)

**Question-and-Answer session:**

<b>No.</b>	<b>Question/Comment</b>	<b>Author</b>	<b>Expert comment</b>
1.	What is the width of the road?	Local population	<p>On average the width of the road is 30 50 m. The mentioned section of the road will be upgraded from 2-lane to 4-lane highway.</p> <p>Detailed measurement will be shown in LARPs, which will be disclosed as soon as it will be prepared.</p>
2.	We are interested if any kind of compensation/ allowances for vulnerable people is envisaged by the project.	Local population	<p>If AHs receive Governments subsidies, or have status of the family, which is “under the poverty line”, or headed by the single-mother, etc, and there are official information/documents related to the above-mentioned status, all these persons will receive additional allowances.</p>
3.	What is the price of 1 sq. m. land plot?	Local population	<p>At present the research/evaluation process of identification of market rate for land compensation is underway. Evaluation methodology implies identification of market price on the basis of real negotiations related to the existing legal documents confirming ownership rights and acquisition of land plots.</p>
4.	In case of negotiations failed related with price, what will be the next stage?	Local population	<p>In case, there remains further dispute related to ownership, the case may be referred to the Rayon court and conclusion regarding ownership right will be made according to the court decision. But, before the court it can be solved by negotiations. At the information booklets you can find Claims and Comments Submission Forms.</p>
5.	How many people will be employed during the road construction process?	Local population	<p>During the construction period in tender documents the employment of local population will be taken into account (it concerns both qualified and non-qualified employees). But first of all priority will be given to the vulnerable people which also will be reflected in tender documents.</p>
6.	What is the land compensation price?	Local Population	<p>At present the research/evaluation process of identification of market rate for land compensation is underway taking into account investors and government's interests. Evaluation methodology implies identification of market price on the basis of real negotiations related to the existing legal documents confirming ownership rights and acquisition of land plots.</p> <p>Final price will be identified when the representative of Roads Department will come to each affected landowner to sign the contract.</p>

Attachmnt #1 - The list of participants of Public Hearings in Gardabani District

ბოლომ გუბნიცის  
Public Consultations

N	ბოლომ, გუბნიცის	ბოლომ/ბოლომ/ბოლომ	ბოლომ	ბოლომ
1.	<del>ბოლომ, გუბნიცის</del>	<del>ბოლომ/ბოლომ/ბოლომ</del>	<del>ბოლომ</del>	<del>ბოლომ</del>
2.	ბოლომ, გუბნიცის	599-26-46-88	ბოლომ	ბოლომ
3.	ბოლომ, გუბნიცის		ბოლომ	ბოლომ
4.	ბოლომ, გუბნიცის	585 08 25 65	ბოლომ	ბოლომ
5.	ბოლომ, გუბნიცის	549 56 93 54	ბოლომ	ბოლომ
6.	ბოლომ, გუბნიცის		ბოლომ	ბოლომ
7.	ბოლომ, გუბნიცის		ბოლომ	ბოლომ
8.	ბოლომ, გუბნიცის		ბოლომ	ბოლომ
9.	ბოლომ, გუბნიცის	ბოლომ	593 61 60 65	ბოლომ
10.	ბოლომ, გუბნიცის	ბოლომ		ბოლომ

ბოლომ, გუბნიცის



## Annex #2 – The list of participants of Public Hearings in Rustavi.

თბილისი-რუსთავის გზის მშენებლობის პროექტი

Tbilisi-Rustavi Road Construction Project


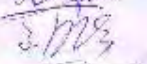








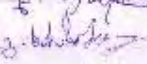







საჯარო კონსულტაციები/Public Consultations

საჯარო კონსულტაციების მამსწრეთა სია/ List of participants of the public consultation meetings

20 December, 2011

Governor's Office

/სამსახური/სამსახური/სამსახური

Nº	სახელი, გვარი/Name	რეგიონი, სოფელი/Region, village	ტელეფონი: Tel/Mob:	ხელმოწერა/Signature
1.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
2.	მელიქიძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
3.	მელიქიძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
4.	გვარამია სოსტანოვსკი	ქ. სტალი	577 95 30 64	
5.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
6.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
7.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
8.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
9.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
10.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
11.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
12.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
13.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
14.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
15.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
16.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
17.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	
18.	ნოზაძე სოსტანოვსკი	ქ. სტალი	577 95 30 64	

Երկր-գլխ

Երկ-ընթ

Զե ծոք. երկրածի

20	Ջեմալ Բախտ	պրոպիա Կոնստանդնուպոլիս	59119-38-28
21	Բախտյան Բախտյան	Երևան	25-88-90
22	Բախտյան Բախտյան	Երևան	253448
23	Բախտյան Բախտյան	Երևան	577564577
24	Բախտյան Բախտյան	Երևան	557-73-31-21
25	Բախտյան Բախտյան	Երևան	599-210-209
26	Բախտյան Բախտյան	Երևան	730-60-47
27	Բախտյան Բախտյան	Երևան	593-29-53-38
28	Բախտյան Բախտյան	Երևան	555-404192
29	Բախտյան Բախտյան	Երևան	59017-37-95
30	Բախտյան Բախտյան	Երևան	598945043
31	Բախտյան Բախտյան	Երևան	599580789
32	Բախտյան Բախտյան	Երևան	59953113
33	Բախտյան Բախտյան	Երևան	57795-30-120
34	Բախտյան Բախտյան	Երևան	593-15-51-14
35	Բախտյան Բախտյան	Երևան	591110601
36	Բախտյան Բախտյան	Երևան	599540240
37	Բախտյան Բախտյան	Երևան	57115-12-12
38			
39			
40			
41			
42			
43			
44			
45			

## REFERENCES

1. ADB Safeguard Policy Statement , 2009

### Hydrology

1. „Водные ресурсы Закавказья" .Под ред. Г.Г. Сванидзе и В.Ш. Цомая- Ленинград, изд., гидрометеоиздат". 1988 г.
2. „Ресурсы поверхностных вод СССР, том 9, Закавказье и Дагестан, выпуск 1, западное Закавказье " Под ред. Г.Н. Хмаладзе и В.Ш. Цомая - Ленинград, изд. „гидрометеоиздат". 1972 г.
3. “Технические указания по расчету максимального стока рек в условиях Кавказа" – Тбилиси, изд. „ Закавказский региональный научно-исследовательский институт (Зак НИИ)" . 1980 г.

### Geology

1. Mrevlishvili N., “Geology of Georgia” (1997), TSU, Tbilisi
2. Geomorphology of Georgia (1971), “Metsniereba”, Tbilisi
3. Hydrogeology of the USSR, v. X, Georgian SSR, Publishing house “Nedra”, Moscow, 1970.
4. Tsagurishvili A et al. 1:25 000-scale engineering-geological survey within the borders of the river Mtkvari gorge, from Tbilisi to the state border of Georgia, Tbilisi, 1981.
5. Papava D., Devdariani E., Ageev V., Report of 1:25 000-scale geological survey works, Tbilisi, 1971.

### Ecology - Flora

1. zazanaSvili n. 1997. saqarTvelos daculi teritoriebi: awmyo da momavali. WWF. Tbilisi.
2. ivaniaSvili m. 2000. biologiuri mravalferovnebis saerTaSoriso garemosdacviti kanoni. meridiani, Tbilisi.
3. kecxoveli n.n. 1957. saqarTvelos kulturuli mcenareTa zonebi. mecniereba. Tbilisi.
4. kecxoveli n.n. 1959. saqarTvelos mcenareuli safaris ruka. danarTi wignisa: `saqarTvelos mcenareuli safari". Tbilisi.
5. kecxoveli n.n., 1960. saqarTvelos mcenareuli safari. Tbilisi.
6. kecxoveli n.n. (red.) 1977. daviqvaT saqarTvelos ssr veluri da kulturuli mcenareebi. saq. mecn. akad. gamoc., Tbilisi.

6. **mayasvili a. 1995. saqarTvelos xeebi da buCqebi (red. g. naxucrisvili da n. zazanasvili). WWF, Tbilisi.**
6. **saqarTvelos mcenareebis sarkvevi. 1969. 2. saq. mecn. akad. gamoc., Tbilisi.**
6. **saqarTvelos flora. 1941-1952. 1-8. saq. mecn. akad. gamoc., Tbilisi.**
6. **saqarTvelos flora. 1970-2000. 1-13. mecniereba, Tbilisi.**
6. **saqarTvelos ssr witeli wigni. 1982. sabWota saqarTvelo, Tbilisi.**
6. **qvacakize r. 1996. saqarTvelos geobotanikuri daraoneba. mecniereba, Tbilisi.**
6. **qvacakize r. 2001. saqarTvelos tyeebi. Tbilisi.**
7. Гребенщиков О.С. 1965. Геоботанический словарь. Русско-Английско-Немецко-Французкий. Наука, Москва.
8. Гулисашвили В.З. 1964. Природные зоны и природно-исторические области Кавказа. Наука, Москва.
9. Долуханов А.Г. 1989. Растительность Грузии. 1. Лесная растительность Грузии. Мецниереба, Тбилиси.
10. Мардалеишвили Т.К. 1970. Новые и редкие виды Восточной Грузии. Systematicae ac Geographicae Instit. Botan. Tbilissiensis. 28, 105-109.
11. Черепанов С.К. 1981. Сосудистые растения СССР. Наука, Ленинград.
12. Braun-Blanquet, J. 1964. Pflanzensoziologie, Grundzüge der Vegetationskunde, 3rd ed. Springer, Wien-New York.
13. Canter L.W. 1996. Environmental impact assessment. 2<sup>nd</sup> ed. McGraw-Hill. New York, London, Tokyo, Toronto.
14. Convention on Biological Diversity. 1995. UNEP. Switzerland (Russian version).
15. Council of Europe. Convention on the conservation of European wildlife and natural habitats. Bern, 19.09.1979.
16. Forest Code of Georgia. 1999. Tbilisi.
17. Gagnidze R., Svanidze T., Gvritishvili M., Dekanoidze N., Kanchaveli K. 1996. Botanical description of territories along the Pipeline Route from Azerbaijan border to Supsa terminal. Literature review. Vol. 2/ Biological Environment. GPC, GIOC, Tbilisi, 1-103 (in Georgian).
18. Groombridge B. (ed.). 1992. Global biodiversity: Status of the Earth's Living Resources. Chapman & Hall, London, 47-52.
19. Harcharik D.A. 1997. The future of world forestry. Unasylya 190/191, 48, 4-8.
20. Hilton-Taylor, C. (compiler). 2000. 2000 IUCN Red List of Threatened Species. IUCN, Gland, Switzerland and Cambridge, UK.
21. Isik K., Yaltirik F., Akesen A. 1997. The interrelationship of forests, biological diversity and the maintenance of natural resources. Unasylya 190/191, 48, 19-29.



- 22.** IUCN. 2001. IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.
- 23.** IUCN. 2003. 2003 IUCN Red List of Threatened Species. [web application]. Available at [www.iucnredlist.org](http://www.iucnredlist.org). (Accessed: 27 September 2004).
- 24.** IUCN 2004. 2004 IUCN Red List of Threatened Species. [web application]. Available at: <http://www.iucnredlist.org>.
- 25.** IUCN Red List Guidelines 2004 [web application]. Available at: <http://www.iucnredlist.org>.
- 26.** Kikodze, D. 2002. Environmental baseline - BTC/SCP Pipeline Project ESIA. Dzelkva Ltd.
- 27.** Lanly J.-P. 1997. World forest resources: situation and prospects. *Unasylva* 190/191, 48, 9-18.
- 28.** Morris P. 1995. Ecology overview. EIA. 197-225.
- 29.** Morris P., Thurling D., Shreeve T. 1995. Terrestrial ecology. EIA, 227-241.
- 30.** Nakhutsrishvili G. 1999. The Vegetation of Georgia. *Braun-Blanquetia*, 15, 1-74.
- 31.** Nakhutsrishvili G. 2000. Georgia's basic biomes. Biological and Landscape Diversity of Georgia. WWF, BMZ, Tbilisi, 43-68 (in Georgian, English).
- 32.** Red List of Endangered Species of Georgia. 2003. Legisl. Proc. 3, Order N76, GSS Codex, GSS code-[www.gss-ltd.com](http://www.gss-ltd.com).
- 33.** Red List of Georgia. 2006. Internet version, order.
- 34.** Sakhokia M.F. 1961 (ed.). Botanical excursions over Georgia. Tbilisi.
- 35.** The 2000 IUCN red list of threatened species. 2000 UNEP, WCMC.
- 36.** WDPA Consortium. 2004. 2004 World Database on Protected Areas. IUCN-WCPA and UNEP-WCMC, Gland, Switzerland, Washington, DC, USA and Cambridge, UK.
- 37.** Zazanashvili N., Sanadiradze G. 2000. The system of protected areas of Georgia at the junction of 20<sup>th</sup> – 21<sup>st</sup> centuries. Biological and Landscape Diversity of Georgia. WWF, BMZ. Tbilisi, 251-276 (in Georgian and English).

## **Ecology - Fauna**

1. Bukhnikashvili. A., kandaurov A., Natradze I., 2008, Action Plan to protect the chiroptera in Georgia//Champester, Tbilisi, Georgia UNIVERSAL, p. 103.
2. Kutubidze M., 1985, Reference book of birds of Georgia, //Tbilisi, p. 648.
3. Law No. 2356-IIS "On the Red Data List and Red Book of Georgia: by Eduard Shevardnadze, President of Georgia, Tbilisi, June 6, 2003;
4. "Georgian Law on fauna", Decree No. 540 of December 26, 1996 by the President of Georgia.
5. Red Book of the Georgian SSR, 1982// "Soviet Georgia", Tbilisi, p. 255.
6. Decree #303 of May 2, 2006 of the President of Georgia, "On Approval of the Red Data List of Georgia" (Endangered Species List).

7. Bakradze M., Tarkhnishvili D., Chkhikvadze V., 1987, "About the spread of Syrian Spadefoot Toad (*Pelobates syriacus*) in Georgia", // Herald of the Academy of Sciences of Georgian SSR, CXXVII, №1: 165-168.
8. Bukhnikashvili. A. 2004. On Cadastre of Small Mammals (Insectivora, Chiroptera, Lagomorpha, Rodentia) of Georgia. // Publ. Hous "Universal". Tbilisi: 138 pp.
9. Didmanidze E., Skhirtladze I., Ninua N., Gurgenidze L., Chkhikvadze V., 2002, "About some endemic, rare and endangered species of fauna in Georgia".//New guidelines to solve the problems.//Tbilisi, Georgia "Satula", p. 65.
10. Morgilevskaya I., 1989. Catalogue of Collection of Small Mammals of Institute of Zoology, Georgian Academy of Sciences. Tbilisi, Metsniereba. p. 28.
11. Muskhelishvili T., 1970. Reptiles of Eastern Georgia. Tbilisi, Metsniereba.
12. Abuladze, A., Eligulashvili, B., Shergalin, J., 2002. Wintering of raptors in Georgia // Raptors in the New Millenium. Proc.of the World Conf. on Birds of Prey & Owls "RAPTORS 2000". Eilat, Israel, 2-8.04.2000. Ed. by Reuven Yosef, Michael L. Miller & David Pepler: 141.
13. Abuladze A., 1994. Birds of Prey in Georgia in XX c. Meyburg. raptor Conservation Today, WWGBP. Pica Press. pp. 23-28.
14. Abuladze A., 1997. Breeding Bird Survey along Oil Pipeline Route.
15. Abuladze A., 1998. Wintering Bird Survey along Oil Pipeline Route
16. Abuladze, A.V. 1979. Nesting of Griffon Vulture in East Georgia. Collection of papers "Nesting ecology of birds and methods of its study". Samarkand, Uzbekistan: 5-6. Text in Russian.
17. Abuladze, A.V. 1979. Data on distribution and biology of Egyptian Vulture in Georgia. Materials of 4th Conference of young researches of the Institute of Zoology of Georgian Academy of Sciences. Tbilisi, Metsniereba: 27-30 . Text in Russian.
18. Abuladze, A. 1993. The Black Stork in East Georgia in the 20th Century. Abstracts of the 1st International Black Stork Conservation and Ecology Symposium (Latvia, Jurmala, 19-24 April 1993): 23
19. Badridze J. *et al* (Editors: Tarkhnishvili D., Kikodze D.), 1996. Principal Characteristics of Georgian Biodiversity// Natura Caucasica, Vol. 1, p. 46.
20. Bukhnikashvili A., Kandaurov A., 1998. The Threatened and insufficiently studied species (Insectivora, Rodentia).// Tbilisi: 56 pp., 27 maps.
21. Bukhnikashvili A., Kandaurov A., 2002, "The Annotated List of Mammals of Georgia" //Proceedings of the Institute of Zoology of Academy of Sciences of the Georgia, Metsniereba, Tbilisi, vol. XXI : 319 – 340. [2004.08 - 04/17.48 VINITI]
22. Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention or CMS;), Secretariat of the Convention, September 1993.
23. E. Didmanidze, 2005, The butterflies of Georgia//Zoological Department of S. Janashia Museum of Georgia, Tbilisi, Georgia, "Sezan", 87 pages
24. Elanidze R.F., 1983. Ichthyofauna of Rivers and Lakes of Georgia. Tbilisi, Metsniereba. (in Russian).
25. Elanidze, R.F., Demetrashvili, M.G., Burchuladze, O.G., Kurashvili, B.E., 1970. Atlas of the freshwater fish of Georgia. Metsniereba publ. house, Tbilisi.
26. Galvez R.A., Gavashelishvili L., Javakhishvili Z., 2005, Raptors and Owls of Georgia//GCCW and Buneba Print Publishing: 128 pages
27. Janashvili A., 1963. Animals of Georgia, Vol. III - Vertebrates. Tbilisi.
28. Tarkhnishvili, D., Kandaurov, A., Gurielidze, Z. and Matcharashvili, I., 1996. Review of Literature and Other Sources about Condition of the Environment on

the Territory of Georgia along the Early Oil Transportation Pipeline Corridor and Adjacent Territories from Georgia-Azerbaijan Border to Supsa Terminal. Zoology. pp. 1-53, Tbilisi, GPC: 1-53.

29. Tarkhnishvili, D. N., 1997. The Status of Amphibian Species in Georgia (C.I.S). DAPTF Reports series, J.W. Wilkinson (ed.), The Open University, Milton Keynes (UK).
30. Tarkhnishvili D., Kandaurov A., Bukhnikashvili A., 2002, "Declines of amphibians and reptiles in Georgia during the 20th century: virtual vs. actual problems" //Zeitschrift für Feldherpetologie, 2002, № 9: 89-107.
31. Tarkhnishvili D., Serbinova I., Gavashelishvili A., 2009, Modelling the range of Syrian spadefoot toad (*Pelobates syriacus*) with combination of GIS-based approaches// Amphibia-Reptilia 30: 401-412
32. The Red Data List of Threatened Animals. IUCN. 2003 Internet version.

### **Cultural Heritage**

1. Tbilisi, Old Capitals of Georgia, Tbilisi 2006
2. I. Gdzelishvili, O. Tkeshelshvili, Material Monuments of Tbilisi, Tbilisi 1961
3. M. Karbelashvili, S. Kintsurashvili, N. Jamberidze, Architectural Guide to Tbilisi, Tbilisi 1958
4. Collections Rustavi I, II, II, collective authorizes, Tbilisi 1996, 1998 and 2005
5. Levan Tchilashvili, Town Rustavi, Tbilisi 1958
6. Levan Tchilashvili, Towns in Feudal Georgia I, II, Tbilisi 1968, 1970

### **Emission Modelling**

1. "Methodology of Determination of Harmful (Pollutant) Substance Dispersions in Ambient Air through Motor Traffic Moving on Highways", developed by the Research Institute of Protection of Ambient Air (Research Institute Atmosphere) of the Federal Service on Ecological, Technological and Nuclear Supervision, 8<sup>th</sup> December, 2005, Saint-Petersburg
2. Ecologist-3, Saint-Petersburg, 2005

### Experts Participating in IEE Preparation

Paata Chankotadze	Project Manager
Andrei Kndaurov	Ekology (fauna)
Lali Akhalaia	Cultural Heritage
Mariam Kimeridze	Ekology (flora)
Baadur Ukleba	Hydrology
Irakli Kaviladze	Social Issues; Waste Management;
Environmental Agency	Samling and Laboratorial Analysis