Environmental Assessment Report

Initial Environmental Examination
Rehabilitation and Reconstruction of Secondary Road Zugdidi-Jvari-Mestia-Lasdili Road KM.100 – KM.110, KM.111-KM.115 and KM.117-KM.120 KP

Project Number: 42414
May 2010

Proposed Multitranche Financing Facility
Georgia: Sustainable Urban Transport Investment Program

CURRENCY EQUIVALENTS

(as of 10 May 2010)

Currency Unit – lari (GEL)

GEL1.00 = $0.57

$1.00 = GEL1.75

ADB	–	Asian Development Bank
CAS	–	Center of Archaeological Search of the Ministry of Culture and Sports
MoE	–	Ministry of Environmental Protection and Natural Resources
IEE	–	Initial Environmental Examination
GIS	–	Geographical Information Systems
EMP	–	Environmental Management Plan
MAC	–	Maximum Admissible Concentrations
RAP	–	Resettlement Action Plan
MoA	–	Ministry of Agriculture
MLHSP	–	Ministry of Labor, Health and Social Protection
GOG	–	Government of Georgia
NGO	–	nongovernment organization
MUFSRA	–	Management Unit for Food Safety and Risk Analyze of the Ministry of the Agriculture
FS	–	Feasibility Study
MDF	–	Municipal Development Fund
EIP	–	Environmental Impact Permit
MoED	–	Ministry of Economic Development
SPS	–	Safeguard Policy Statement

CONTENTS

I. EXECUTIVE SUMMARY

1. Upgrading and improvement of local transport and transport-related infrastructure plays a significant role in the development of Georgia infrastructure. To this effect a number of important activities have been implemented and financed from the budget of Georgia and from other sources. Improvement of transport and related infrastructure plays an important role in improvement of Georgia's urban infrastructure. Recently several significant programs, financed through state budget, loans and grants, have been implemented with this regard. Notwithstanding the efforts undertaken so far several problems need to be solved regarding development of transport infrastructure.

2. Rehabilitation of Zugdidi-Jvari-Mestia-Lasdili motor road was initiated by the Department of Motor Roads of Georgia. The road is of national significance and connects upper Svaneti region with Tbilisi-Senaki-Leselidze main motor road. Currently the road needs significant rehabilitation in order to restore its operational capacity and ensure traffic safety. Certain sections and infrastructure facilities of the road need significant reconstruction.
The secondary road Zugdidi-Jvari-Mestia-Lasdili links the villages located in Zeda Svaneti region, Daba Mestia and Mestia with the region Zugdidi as well as with the trunk road Tbilisi-Senaki-Leselidze, which is the main road in the region. It should be noted that the present project will significantly contribute to the socio-economic development of Zeda Svaneti region and facilitate development of tourism infrastructure.

3. The Municipal Services Development Project funded by the Asian Development Bank (ADB). Presented project is one of various projects backed by international donor organizations to be implemented by the Municipal Development fund (MDF).

4. MDF aims at strengthening institutional and financial capacity of municipalities through investing financial resources in local infrastructure and services, and on improving on sustainable basis the primary economic and social services,

A. Current Situation

5. The project section is divided into 6 lots in accordance with the Terms of Reference. In this document presented 3 following sections of the secondary road Zugdidi-Jvari-Mestia-Lasdili (Figure 1):

1. Section 1: Km.100 – Km 110;
2. Section 2: Km.110 – Km 115;
3. Section 2: Km.117 – Km 120.

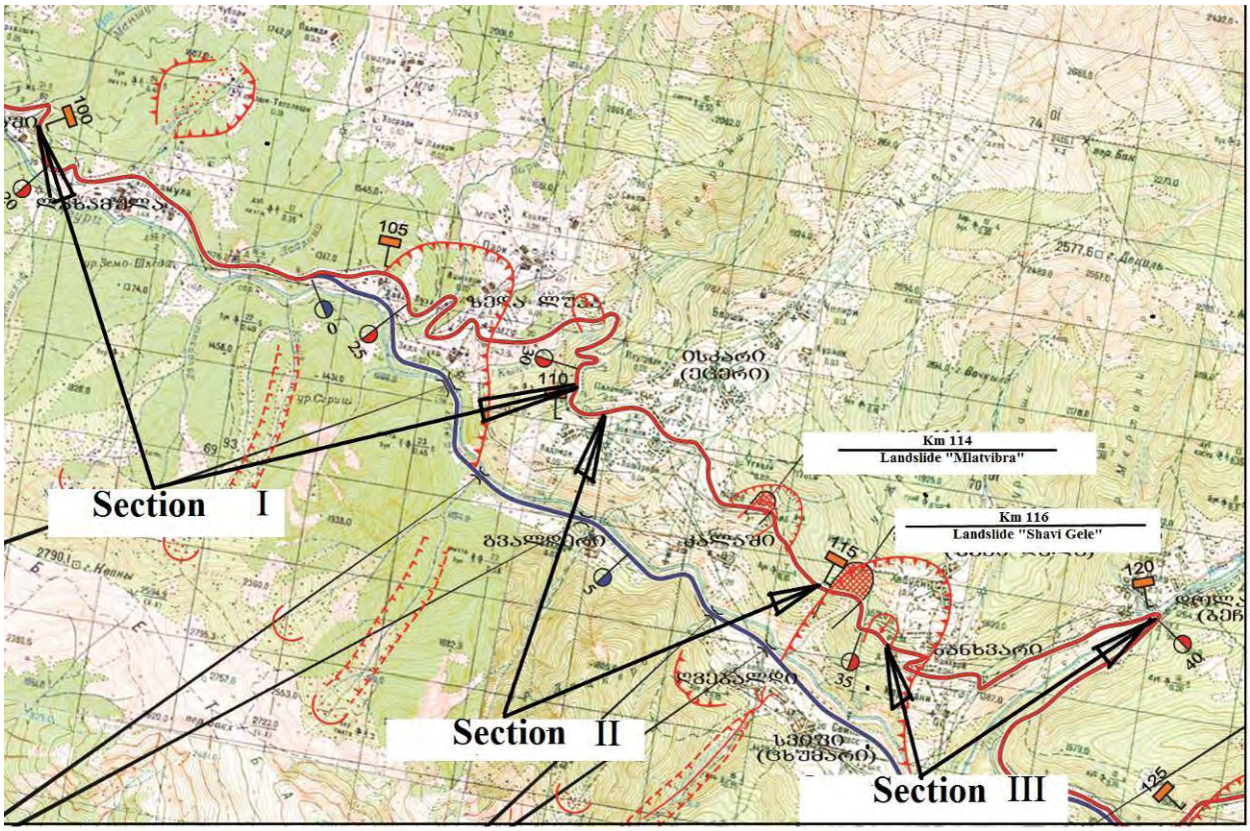

Figure 1 Presented 3 sections of the secondary road Zugdidi-Jvari-Mestia-Lasdili

6. The existing and project road starts on the bench of the left slope of the right tributary of the river Enguri and goes along the right slopes of the river Enguri until the end of the gorge.

7. Road pavement structure is two-layer asphalt-concrete pavement (thickness 6+4 cm) and crushed aggregates (fraction 0-40 mm,) thickness 16 cm.

8. Technical norms applied in the design are as follows:
   (i) Category of road - IV;
   (ii) Width of road bed - 7.0 - 8.0 m;
   (iii) Width of carriageway - 6.0 m;
   (iv) Width of shoulder - 0.5-1.0 m;
   (v) Pavement type - cement-concrete.

9. The existing and project road starts on the bench of the left slope of the right tributary of the river Enguri and goes along the right slopes of the river Enguri until the end of the gorge. The slopes are formed by clay-slates[1], with rare insertions of sandstone[2]. Clay-slates are easily weathered and contribute and are exposed on slopes.

[1] **Slate** is a fine-grained, foliated, homogeneous metamorphic rock derived from an original shale-type sedimentary rock composed of clay or volcanic ash through low-grade regional metamorphism

[2] **Sandstone** (sometimes known as arenite) is a sedimentary rock composed mainly of sand-sized minerals or rock grains

10. In The The structures of pavement of I section of carageway accepted are as follows: sections where asphalt-concrete pavement is partially maintained (Figure 2) - milling of surface, construction of leveling layer of sand and gravel. There are no soil settlement and soil deformation areas. Related with asphalt-concrete pavement there is better situation on II and III sections of the project area where the thickness of the asphalt in some areas is 12-14 cm (Figure 3).

Figure 2. Asphalt-concrete and sand and gravel pavements at the I section of the project raud. Km 106

Figure 3. Asphalt-concrete and sand and gravel pavements at the II section of the project raud. Km 113

B. Brief Outline of the Contents of the Report

11. The IEE was prepared in accordance with Georgia's environmental legislation, ADB's safeguard policy (2009) and MDF's procedures and environmental guidelines. The objectives of the IEE are the following:

(i) Define potential positive and negative environmental impact in for various reviewed alternatives;
(ii) Provide technical information and recommendations to facilitate selection of the best alternative;
(iii) Prepare an Environmental Management Plan (EMP) including action for mitigation of likely damage, monitoring plan and description of institutional measures;
(iv) Ensure mechanisms for public participation and information dissemination on the basis of relevant legislation and existing procedures.

1. Policy, legal and administrative framework

12. 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.

a. Environmental permitting and public consultation

13. 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.

14. 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.

15. The 6th 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:

16. According to article 6, a developer is obliged to carry out public discussion of the EIA before its submission to the administrative body responsible for issuing a permit.

b. Other Environmental Laws relevant to the project

17. **The Law on the Environmental Protection Service (Agency).** In accordance with the 'Law on the Environmental Protection Service of 2008, an environmental protection control system has been established to ensure the following: (a) state control in the field of environmental protection and ecological systems safety, (2) observance of the proper laws by the subjects of regulation, (3) population's trust in the system and in state organs, generally in respect of performance of state obligations and transparency in the field of environmental protection. Under the same Law, there an environmental protection agency established (on the basin of a former environmental protection inspection of MoE) and the functions of its employees specified by regulations of MoE. In particular, they are authorized to conduct an environmental inspection of the required agencies (physical and legal entities, state authority and local self-governing bodies) and monitoring of their activities. Besides, the prerogative of the environmental protection agency is to calculate the damage to the environment to compensate it to the state, put forward the requirement to compensate for the damage, and in case of non-compliance, file a proper appeal before the court.

18. The "Georgian Law on Ambient Air Protection" was put into effect from 1 January 2000. The scope of this low is to protect ambient air in Georgia from harmful human impact. This law does not govern the field of air protection in work places. The main competences of governmental authorities in the field of ambient air protection are; (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. 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 from Ministry of Economic Development (MoED)

19. The ‘Law of Georgia on Cultural Heritage’ (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 , as well as on construction of an object of a special importance as 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. Also according the article 10.1 of this low “If physical or legal person finds out cultural heritage during the working activities and continuation of these activities can damage, destruct or represent a danger for it, physical or legal person should immediately stop working activities and inform the Ministry by the letter during 7 days about the ceasing of working activities as well as about the cultural heritage which has been revealed, discovered or there is a reasonable assumption related it”.

2. ADB Environmental Guidelines

20. All projects funded by ADB must comply with ADB Safeguard Policy as set out in the Safeguard Policy Framework (2009). The purpose of the environmental safeguards to establish an environmental review process to ensure that projects undertaken as part of programs funded under ADB loans are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause a significant environmental, health, or safety hazards.

21. Safeguard policies are generally understood to be operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process.
ADB’s safeguard policy statement (SPS) sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

(i) The Involuntary Resettlement Policy (1995);
(ii) The Policy on Indigenous Peoples (1998), and
(iii) The Environment Policy (2002).

a. Environmental Impact Assessment (EIA)

22. The process of EIA evaluates the potential environmental risks and impacts of a specific project in its area of influence, examines alternatives to the project, identifies ways of improving project selection, sitting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts. EIA includes the process of mitigating and managing adverse environmental impacts during the implementation of a project

23. According to the ADB policy environmental assessment report should include:
A. Executive Summary
B. Policy, Legal, and Administrative Framework
C. Description of the Project
D. Description of the Environment (Baseline Data)
E. Anticipated Environmental Impacts and Mitigation Measures
F. Analysis of Alternatives
G. Information Disclosure, Consultation, and Participation
H. Grievance Redress Mechanism
I. Environmental Management Plan
J. Conclusion and Recommendation

3. Public consultation

24. This process is intended to involve the public in project design and exchange information with stakeholders to the benefit of the project. The IEE and EIA reports should: (i) recommended measures for continuing public participation; (ii) summarize major comments received from beneficiaries, local officials, community leaders, NGOs, and others, and describe how these comments were addressed; (iii) list milestones in public involvement (e.g., dates, attendance, topics of public meetings), and recipients of the report and other project-related documents; (iv) describe compliance with relevant regulatory requirements for public participation; (v) if possible summarize public acceptance or opinion on the proposed project; and (vi) describe other related materials or activities (e.g., press releases, notifications) as part of the effort to gain public participation. This section will provide of summary of information disclosed to date and procedures for future disclosure.

C. Description of the Project

25. The secondary road Zugdidi-Jvari-Mestia-Lasdili links the villages located in Zeda Svaneti region, Daba Mestia and Mestia with the region Zugdidi as well as with the trunk road Tbilisi-Senaki-Leselidze, which is the main road in the region. Maintaining of the existing axis and longitudinal profile is stipulated under the present project due to the fact that the project section is located in highland, on steep slopes of the river Enguri (making not feasible to change the road plan significantly). Minor changes are done on some sections to improve traffic safety conditions.

26. The roadbed shall be restored under the project to meet the technical requirements. The existing engineering structures repaired and restored, new engineering structures constructed if necessary. Construction of new road pavement instead of heavily damaged asphalt-concrete pavement is stipulated under the present project.

27. It should be noted that the present project will significantly contribute to the socio-economic development of Zeda Svaneti region and facilitate development of tourism infrastructure.

28. Design and bidding documents for the rehabilitation of secondary road Zugdidi-Jvari Mestia- Lasdili, section km 81-km 139 (part which is the presented project) were carried out by Transproject Ltd based on Agreement signed with State Department of Roads of Georgia[3].

29. The project section is divided into 6 lots in accordance with the Terms of Reference. In this document presented 3 following sections of the secondary road Zugdidi-Jvari-Mestia-Lasdili:

(i) Section 1: Km.100 – Km 110;
(ii) Section 2: Km.110 – Km 115;
(iii) Section 3: Km.117 – Km 120

30. Road pavement structure is changed in accordance with the requirements set forth in the Terms of Reference. Instead of two-layer asphalt-concrete pavement (thickness 6+4 cm) and crushed aggregates (0-40 mm, thickness 16 cm) stabilized with cement and bitumen

[3] Agreement with State Department of Roads of Georgia signed on 25.07.2008 and Terms of Reference issued on 11.02.2009.

emulsion, it is stipulated to construct the pavement of reinforced cement-concrete thickness 22 cm on the base of crushed aggregates (0-40 mm) thickness 25 cm under the present project.

1. Description of the Environment (Baseline Data)

a. Physical Resources

31. Georgia is situated at the crossroad of South-East Europe and West Asia and it is a transcontinental country by its location although it is part of Europe by its socio-political situation and culture (Figere 7). Total area of the country is 69,700 km^2. Administratively there are 12 administrative units.). Each administrative unit is divided into Municipalities (64 municipalities in total). The Zugdidi-Jvari-Mestia-Lasdili motor road section is located on the territory of Mestia Municipality in Samegrelo-Zemo Svaneti administrative region.

b. Atmosphere

32. Average annual temperature of air is $+5,8^0$ (Mestia) $10,6^0$ (Khaishi), temperature of the coldest months (I, II, III, XII) fluctuates from $-1,4$-$2,7^0$ (XII) to $-4,9$-5^0 (I, II). Absolute minimum air temperature is -35^0, absolute maximum $+35^0$.

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33. Average annual speed of wind is _ 0,9 m/s, and the highest and lowest speed of wind in winter is _ 1,4 m/s and 0,2 m/s respectively and in July _ 2,0 m/s and 0,8 m/s respectively. The highest speed of wind was identified in April and May (1,4 mm).

c. General Physical-Geographic Characteristic

34. Khaishi-Mestia motor road section entirely goes through river Enguri basin, which structurally belongs to central Caucasus unit and its nature is represented by extremely difficult high-mountainous landscape. Average absolute elevation of the main ridge is over 4,000 m, and maximum elevation is above 5,000 m. The number of mountain massives whose hypsometric indicators exceed 4,000 m reaches 36 and the elevation of the passes among them fluctuates in the following range: 3161-3866 m.

35. Character of the landscape of Svaneti Caucasus Mountains is defined by its layers' characteristics and hypsometric location. Its Northern part is formed by layers that are especially stable with regard to denudation-erosive processes. Svaneti Caucasus Mountains Southern slope with crystal sub-strata and regional overthrust in the South, which is mainly formed by almost homogenous slate type set, which is easily complaisant to erosive- denudation processes.

d. Surface water

36. River Enguri gorge, which is known also as Zemo Svaneti depression, is characterized by sub-latitude direction and morphologically it represents tectonic-erosive cavity.

37. River Enguri, which originates at Namkvani glacier at 2,800 m elevation, experiences 2,550 m fall over 150 km distance to townlet Jvari. The width of the river gorge, starting from 10-20 meters from the bottom, increases gradually and exceeds 1000-1500 meters. Main tributaries of river Enguri are the following: Odichala (length 15 km), Mulkhura (27 km), Dolra

(20 km), Nakra (22 km), Nenskra (46 km), Tkheisha (18km), Larakvava (17km), Magana (24km), Rukhi (21km), Jumi (61km).

e. Groundwater

38. The water-bearing formation built by contemporary alluvial deposits is characterized by free groundwater table declined along the general flow of the rivers. The water table depths vary from 0.5 m to 5.0 m. At some locations nearby riverbeds and groves, groundwater depths are reduced to 0.3 m. The aquifer is characterized by rich water resources, with debits of the springs varying in the range of 0.1-3.5 l/s. The aquifer is mainly fed from river and precipitation waters. Despite the aquifer is rich with water, its practical water use is limited due to restricted distribution of the alluvial deposits. In addition, it shall be stated that impact on this aquifer should be minimal due to limited work quantities to be performed within the grove

f. Geology/Seismology

39. Tectonic areas of the gorge of River Enguri built of Lower-Mid Jurassic Period slates, with the Upper Jurassic and Lower Cretaceous Period carbonate flysch and Mid Jurassic volcanogenic sedimentary rocks. All these rocks are tectonically intensively dislocated and have produced many significant folded structures. Among them Mestia-Shovi synclines, Khibiani, Lukhumi, Kheshuri, Dabieri-Tviberi, Dizi-Ushuri, Lablakhi-Tchviberi, Khaisi anticlines, etc are to be highlighted.

40. The engineering-geological properties of the rocks consisting of these layers differ significantly from each other in terms of stability and strength and belong to the group of low strength hard rocks and semi-hard rocks.

41. In the area of the slate type sets there is a significantly favorable environment created for the development of landslide and especially mudflow processes.
Within the study territory so called ‘Dizi Series’ of the earliest Paleozoic age which form the tallest elevated largest two anticline folds of coulisses disposition towards the general Caucasus direction.

42. The biggest danger is created by mudflow processes, landslides and avalanches. Similarly dangerous are earthquakes and landslide and gravitational events provoked by them. The maximum magnitude of earthquakes is 9 points. It is noteworthy, that in the above mentioned areas the earthquakes of 6-9 points’ magnitude have been observed 20 times after 1930. These earthquakes were accompanied with the significant activation of landslide and gravitational processes.

43. The threat of avalanches is high on the existing sections of the road: km 90; km 95; km 135; km 138. On the100-120km highway the avalanche threat is relatively low. The danger is increases at the sections of the alternative route (km 0; km 3.5; km 6.5 of Tskhumari; and km 9)

g. Forests

44. From its source Riv. Enguri flows to the Ushguli community via the quite wide gorge, which was developed as a result of pleistocenic freezing. In this section of the gorge there is almost no trees and vegetation.

45. Based on the review of the literature and the field surveys the following sensitive areas has been found in the corridor of planned Khaisi-Mestia motor road. They are mainly the forests along the road and immediately adjusting to it:

(i) A small section at 100 km (Riv. Manshura Gorge);
(ii) A small section at km 104 (Riv. Ladlina Gorge);

46. The territory between 120-126 km to the left of the road (from Village Dolasvip up to Village Martskhvarishi).

h. Protected Area

47. In Georgia the history of Protected Areas dates back many centuries. The first Protected Area – Lagodekhi Strict Nature Reserve was established as early as 1912. At present the total area of Protected Areas is 495 892 hectares, which is about 7 % of the country's territory

48. The nearest protected area from project area is Kolxeti National park (Distance from construction area 200 km), which is located in West Georgia, in the Kolkheti coastal plain lying between the mouths of the Tikori and Supsa.

i. Rare or Endangered Species

49. The highway corridor to be reconstructed is located in two main landscapes: there are deciduous and mixed forests and the secondary meadows surrounding the settlements and which are used as pastures and cornfields.

50. According to the zoo-geographical division the South Caucasus belong to the Sub-County of East Meditation Sea of Paleractic County. The highway crosses the Caucasus part of this Sub-County (Vereshagin, 1958; Gazhdiev 1986).

51. The species included in the red list of Georgia (here we include the species which dwell or may present in the corridor impacted by the Khaisi-Mestia highway).

Table 1 List of rare or endangered species

№	Species	Status	Location
	Mammals		
1	Barbastella barbastellus	**VU**	*Construction Area*
2	Sciurus anomalus	**VU**	*Construction Area*
3	Sicista kluchorica	**VU**	*Nearby Construction Area*
4	Prometheomys schaposchnikovi	**VU**	*Nearby Construction Area*
5	Lynx lynx	**CR**	*Construction Area*
6	Lutra lutra	**VU**	*Construction Area*
7	Ursus arctos	**VU**	*Construction Area*
8	Capra caucasica	**EN**	*Nearby Construction Area*
9	Capra cylindricornis	**VU**	*Nearby Construction Area*
10	Rupicapra rupicapra	**EN**	*Nearby Construction Area*
	Birds		
11	*Aquila chrysaetus*	***VU***	*Construction Area*
12	Buteo rufinus rufinus	**VU**	*Construction Area (Hunting Zone)*
13	Neophron percnopterus	**VU**	*Construction Area (Hunting Zone)*
14	Gypaetus barbatus	**VU**	*Construction Area (Hunting Zone)*
15	Aegypius monachus	**EN**	*Construction Area (Hunting Zone)*

16	Gyps fulvus	**VU**	*Construction Area (Hunting Zone)*
17	Aegolius funereus	**VU**	*Construction Area*
18	Tetrao mlokosiewiczi	**VU**	*Construction Area*
19	Panurus biarmicus	**VU**	*Nearby Construction Area in aquatic zone*
Reptilian			
20	Vipera kaznakovi	**EN**	*Construction Area*
21	Vipera dinniki	**VU**	*Construction Area*
Fishes			
22	Salmo fario	**VU**	Medium and big size rovers
23	Varicorhinus sieboldi	**VU**	River Enguri
Invertebrate			
24	Phassus shamil	**EN**	***Construction or Nearby Area***
25	Eudia pavonia	**VU**	***Construction or Nearby Area***
26	Manduca atropos	**EN**	***Construction or Nearby Area***
27	Callimorpha dominula	**VU**	***Construction or Nearby Area***
28	Callimorpha quadripunctata	**VU**	***Construction or Nearby Area***
29	Axiopoena maura	**EN**	***Construction or Nearby Area***
30	Parnassius Apollo	**VU**	***Construction or Nearby Area***
31	Parnassius nordmanni	**EN**	***Construction or Nearby Area***
32	Allancastria caucasica	**VU**	***Construction or Nearby Area***
33	Erebia iranica	**VU**	***Construction or Nearby Area***
34	Polyommates daphnis	**VU**	***Construction or Nearby Area***
35	Zygaena fraxini	**VU**	***Construction or Nearby Area***
36	Bombus eriophorus	**VU**	***Construction or Nearby Area***
37	Bombus alpigenus	**VU**	***Construction or Nearby Area***
38	Bombus persicus	**VU**	***Construction or Nearby Area***
39	Xylocopa violacea	**VU**	***Construction or Nearby Area***
40	Rosalia alpine	**EN**	***Construction or Nearby Area***
41	Onychogomphus assimilis	**VU**	***Construction or Nearby Area***
42	Astacus colchicus	**VU**	***Construction or Nearby Area***
43	Eisenia transcaucasica	**VU**	***Construction or Nearby Area***
44	Dendrobaena faucium	**VU**	*Construction or Nearby Area*
45	Helix buchi	**VU**	*Construction or Nearby Area*

j. Power Sources and Transmission

52. After Georgia became independent, the process of energy sector rehabilitation was started, and this brought together the formation of electric power system as a separate independent structure. In particular, the generation plants were formed as independent electric power stations. Municipality of Mestia is a part of the system and in difference with the last year's energy crisis, now the limit on electric energy and accidents in the area per day decreased. The quality of reliable energy supply, also price rate indicator of electric energy use increased.

k. Tourism Facilities

53. Svaneti is the most beautiful region not only in Georgia but in whole Caucasus. There are lots of feudal era monuments, icons and churches.

54. Table 2 Presented the Areas in Svaneti for verious types of turism

Table 2: Areas in Svaneti for verious types of turism

Lakes	Ugviri, Koruldi, Meziri (Tvebishi)
Cave	Zargashi (Mestia), Shgedi, Budebrivi Gamokvabuli
Picnic spots	In Mestia: Kakhuri, Hatsvali, Ugviri Pass, Ipari, Kali gorge.
Rafting	Mestia grove, Becho (Shikhi grove), Nekra (upper part), Ushguli
Fishing tourism	Chuberi, Lakhamula, Ipari (Adishura)
Horse riding	Mestia-Jabeshi-Adishi-Iprali-Ushguli (5 day tour, GEL 20 per horse, GEL 40-50 for a guide)
Mineral waters	Ushguli, Kala, Ipari, Mulakhi, 7 spots in Mestia, lenjeri, Tskhumari, Etseri.
Natural monuments	River Adishura, upper part; River Galde-Chaladi basin's upper part ("Perkhuli's Stone").
Hiking	Tviberi-Jabeshi, Chalaadi-Mestia, Ushguli-Shkhara glacier, Zuruldi-Mestia, Mazeri-Tvibeshi, Ushba glacier.
Camping sites	Everywhere
Skiing	_
Waterfalls	Dizshi, Mazerashi-Shdugvra
Viewpoints	Mestia, Zuruldi, Hatsvali, Gvaldi, Tskvzagari, Kheshkildi

l. Agricultural Development

55. Agriculture represents the major economical activity of Samegrelo-Zemo SvaneTi Region. During formation of the market relationships, the regional agriculture has established as a free market-oriented sector. Meanwhile, it shall be noted that the transfer from the planned economy to the market oriented system was very painful due to the weak agricultural strategy implemented in the end of 20th century, as well as in result of constraints associated with structural changes of the regional agricultural units with the later provoked by the loss of traditional trade markets. All above reasons leaded to amendment of the structural pattern of regional agriculture during 1990-2000. The land area used for production of the commercially viable tea declined by 91% accompanied with the drop of production value from 200 to 1 million US dollars (USD). In the same period, the cultivated crop area increased from 29.2 thousand to 70.2 thousand hectares, and the area of hazelnut plantations expanded to 19.4 thousand Ha, turning this fruit into the major export product of the regional agriculture. In addition, the new species as kiwi and feijoa entered the sector and currently the local production of these fruits effectively satisfies entire demand of the country's population.

m. Mineral Development

56. The region is distinguished by abundance of mineral water sources comprising more than 200 springs. Mestia District is known by its gold, silver, molybdenum, barite, arsenic, wolfram and marble deposits. The geothermal water sources are located in Tsalenjikha, Chkhorotsku, Zugdidi, Khobi, Martvili and Senaki Districts with the total daily flow of 35

thousand cubic metres. From these, Zugdidi-Tsaishi geothermal field has the highest capacity, with rated flow currently estimated as 14,300 m^3 of 80-100 ^0C water per day.

n. Social and Cultural Resources

i. Population

Municipalities	2001	2002	2003	2004	2005	2006	2007	2008	2009
Samegrelo-Zemo SvaneTi	**460.6**	**466.1**	**462.8**	**459.5**	**460.4**	**471.0**	**469.8**	**467.7**	**468.0**
Poti	45.2	47.1	46.7	46.5	46.7	47.3	47.3	47.4	47.5
Abasha municipality	26.4	28.7	28.4	28.1	28.1	28.2	28.1	27.9	27.8
Zugdidi Municipality	186.4	167.8	166.7	165.7	166.2	172.2	172.1	171.4	171.6
Martvili Municipality	41.3	44.6	44.3	44.0	44.2	44.8	44.6	44.4	44.4
Mestia Municipality	10.7	14.3	14.2	14.0	14.1	14.1	14.2	14.3	14.4
Senaki Municipality	51.2	52.1	51.8	51.5	51.4	52.2	52.0	51.7	51.7
Chkhorotsky Municipality	26.2	30.1	29.9	29.6	29.6	30.2	30.0	29.8	29.8
Talenjikha Municipality	35.5	40.2	39.9	39.5	39.5	40.5	40.3	40.0	40.0
Khobi Municipality	37.7	41.2	40.9	40.6	40.6	41.5	41.2	40.8	40.8

ii. Health Facilities

57. The network of 22 stationary healthcare facilities is operating in Samegrelo-Zemo Svaneti Region. Based on statistical data, annual load of these facilities is 14,380 patients. The healthcare sector employs 1095 doctors and 1554 medium-level medical personnel. From these, 11 employees hold the highest medical scientific degrees (1 doctor and 10 candidates of medical sciences). The municipal and central district hospitals are equipped by clinical, x-ray and functional diagnostic laboratories, as well as have the endocrinology and ultrasonic diagnostic offices and anaesthesia and intensive therapy departments. The cardiology centre "Guli" located in Zugdidi operates 2 reanimobiles. In 2008, Gejati ambulatory of city of Senaki was improved and fitted with the state-of-the-art medical equipment under the framework of Presidential Program. This facility served 984 patients during 10 months. In addition, the same Presidential Program provided modern equipment for Nosiri ambulatory, which served 1748 patients during 10 months.

iii. Education Facilities

58. Based on information of the Ministry of Education and Science of Georgia, 282 secondary schools (including 25 one private ones) and 3 orphanages operate in Samegrelo-Zemo Svaneti Region.

59. In Mestia District there are 24 secondary schools with 2,117 pupils, school children's house, four sport schools, art school, music school, central and village libraries, village clubs and cultural centres.

60. From the villages located immediately along the road the full-fledged (grades 1-12) public schools are in Pari, Etseri and Becho. The primary schools (grades 1-4) are in Qvemo Luha, Ladreri and Qartvani. No public schools are in Nogari, Lakhani, Zemo Luha and Lankhvari, from where children go to schools located in the nearest villages.

iv. Physical or Cultural Heritage

61. The cultural and historical heritage samples of highland part of historical Colchis have the function of original source material for highlighting not only the past of Colchis, but for studying the remote history of other Georgian tribes occupying the entire Caucasus highland, and identification of their role and importance in the Georgian history. These artifacts and monuments also contribute to improved knowledge about the history of trade, economical and cultural relationships with the neighbouring and remote countries.

62. Based on all above, we believe that it is necessary to undertake supervision of the reconstruction works along the entire road alignment by respective specialists to avoid recurrence of the previous adverse cases and exclude destruction of the cultural heritage of this important Georgian region.

63. Such consideration leads to necessity of applying the careful approach to the earthworks, adherence to the archaeological management procedures and engagement of employees of the Ministry of Culture and Archaeological Research Centre in case of archaeological discoveries

v. Historical Sites

64. The scope of cultural heritage monuments of Mestia District comprises 45 churches with frescos in Mestia District, as well as other 107 churches, 311 Svanetian towers and more than 100 Svanetian Houses (Machubi).

2. Anticipated Environmental Impacts and Mitigation Measures

a. Construction Phase

i. Design of Landslip Sections

65. Normal functioning of the automobile road is especially complicated by landslips formed in tectonically unstable slate strata; their deformation depth lies within dozens of meters and their development-activation takes place through integration of complex factors, where earthquake effect has one of significant roles. In these terms the landslip sections are noteworthy: 109 km, 114 km, “Malaia Tvibra” landslips. Complete stabilization of the landslips through engineering constructions is impossible. For the preservation of their dynamic balance we recommend the measures proposed during the characterization of these landslips.

66. Proceeding from the most complex geo-morphological conditions and geological-tectonic structure no alternative of road location is possible – neither on the same slope nor on the second side of the river, because geological processes are widely developed on the mentioned slope and if the slope is newly processed, the processes will develop at larger scale. We consider the preservation of the existing road and implementation of appropriate restoration measures throughout the exploitation as the right decision.

67. Surface landslips are mainly formed in the slope sediments and zones of actively eroded zones and do not pose significant threat to automobile roads. Their majority is formed in the lower junction zone of the road and mostly is developed into debris. The handling of the debris via gabions is not very difficult.

68. At the stage of rehabilitation works on Khaishi-Mestia section of the automobile road the main environmental problem is the allocation issue of the debris. As a result of drilling-explosion and land works the total amount of debris is 260 000 m^3. Debris is formed in River Enguri floodplain and if left there, it shall eventually be washed to Enguri Power Station reservoir.

b. Mitigation Measures

69. The prevention of the anticipated harmful results is necessary through planning of appropriate measures.

(i) Debris should be removed from r. Enguri floodplain for about 3-5 km;

(ii) Prior to carrying debris to the allocation area, in the section where the above process is somehow impeded or requires time debris should be collected in the temporary area of allocation. The area of temporary allocation should be selected and arranged to maximally minimize the washing of the debris by river flow to lower tail waters;

(iii) The selection of the temporary allocation areas is recommended in the meander sections of r. Enguri, where river flow has less velocity and bed trajectory reduced the possibility of washing;

(iv) It is recommended not to chaotically put debris in the temporary allocation areas, but arrangement in the outer perimeter by large fraction of boulders. The diameter of large boulders should be selected to form effective barrier of protection from washing of smaller stones. The system of appropriate gabions could be used;

70. Construction contractor should develop specific plan of temporary and permanent allocation of debris, where the following should be noted: areas of debris allocations; engineering project of allocation (plan, section, etc.); transportation plan; temporary and permanent allocation plan dholes be agreed with the local authorities and regional service of the protection of the environment and natural resources

c. Operation Phase

71. Erosion and ground stability control and landscape management. Road department of Georgia should facilitate control over erosive processes and ground stability as well as landscape restoration monitoring upon the completion of construction and introducing timely corrections. Corrections comprise but are not limited to rehabilitation-maintenance of drainage systems and implementation of anti-erosion measures (berms, restoration of relief and vegetation, etc), whereas necessary.

72. Road waste and pollution with fuel. Road department of Georgia should coordinate and organize the work of appropriate divisions (gas stations; waste management service, etc) and introduction of suitable tools.

73. Pollution of air with emissions, noise and pollution connected with rehabilitation work. Road department of Georgia should facilitate the implementation of those rules during rehabilitation work, which are described in the below management plan for construction works.

74. Prevention and mitigation of health risks and damage connected with spill of toxic substances due to emergency situations. Readiness for emergency situations. Road department of Georgia should participate and encourage the service of reaction to emergencies of the ministry of the internal affairs of Georgia in the development and introduction of the

legislative acts necessary for the reaction action plans to similar emergency situations and their implementation as well as development of regulating legislation on transporting of hazardous material. System of measures should comprise the minimum of the following components:

(i) Development and introduction of safety measures and reaction plans in terms of damage prevention and mitigation as a result of spill of toxic substances;
(ii) Planning of special routes for hazardous substance transportation;
(iii) Introduction of strict control on the transporting of hazardous substances to reduce the danger;
(iv) Prohibition of transporting of toxic waste within sensitive areas.

75. The above measures should be planned according to Georgian legislation – law of Georgia "on Hazardous Chemical Substances" (1998).

76. Prevention of spreading of human, animal and plant diseases. The organization responsible for the control on the possible spread of human, animal and plant diseases during passenger and cargo transporting are the following: customs service, public legal entity "Inspection of Sanitary Supervision" and "National Service of Food Product Safety, Veterinary Service and Plant Protection" of the ministry of agriculture. Applicable legislative acts could be found in Chapter II of EIA.

3. Analysis of Alternatives

77. Non-implementation alternative was not discussed as socio-economic development of Svaneti region, namely, the utilization of its tourist potential, is impossible without the road rehabilitation.

78. The only realistic alternative could be proposed for the existing road section of 105 km-125 km. In substitution to the existing road section the alternative of moving the road to the left river bank was reviewed. At the earlier stage the following became clear as a result of comparing of the alternatives.

79. The mentioned section (105 km-125 km) of the existing road is characterized by medium to high landslip threat:

(i) 109 km landslip – medium threat
(ii) 114 km landslip section (Mala Tvibra) – medium threat
(iii) 120 km village Becho – low threat

80. The mitigation of the landslip processes on the mentioned sections is possible through engineering measures.

81. On the alternative route only two landslip areas of medium threat occur.

(i) 6 km – at village Ghvebelda
(ii) 11 km – in the vicinity of village Magardeli.

82. However, some of the sections of the alternative route are characterized with mudflow and avalanche areas of the highest risk:

(i) 0.0 km – section of the highest mudflow and avalanche threat;
(ii) 3.5 km - section of the highest mudflow and avalanche threat;
(iii) 6.5 km - section of the highest mudflow and avalanche threat;
(iv) 8.5-9.0 km - section of the highest mudflow and avalanche threat.

83. Engineering control of the high energy mudflow and avalanche processes is possible at the above sections. The possibility of the development of hazardous gravitation events is high and results – catastrophic. Hence, the further discussion of the route alternative was found useless.

4. Information Disclosure, Consultation, and Participation

a. Legislation and regulations of Georgia

84. There is no category of EEI in Georgian environmental assessment legislation and public consultation is required only for 21 types of project for which only Environmental Impact Assessment, these requirements are set forth in the law on Environmental Impact Permit (2008). The 6th clause of in mandatory law provides detailed requirements and procedures for conducting public consultations and established timeframes for information disclosure and discussion, namely:

(i) The developer is obliged to carry out public discussion of the EIA before its submission to the administrative body responsible for issuing a permit (normally MoE);

(ii) The 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;

(iii) Appropriate corrections should be incorporated into the main text of the EIA;

(iv) If required. If the comments and proposals of stakeholders are not accepted the letter of explanation should be sent to the authors.

b. ADB Requirements

85. The borrower/client will carry out meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. Meaningful consultation is a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle;1 (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

5. Grievance Redress Mechanism

86. The Project Implementation Unit (PIU) (MDFG in this particular case) has overall responsibility for project implementation and environmental compliance. The administrative bodies responsible for environmental protection are the Ministry of Environmental Protection and Natural Resources (MoE) and the City Hall. The affected population and stakeholders may send their grievances, related to the project induced environmental impacts and nuisance to PIU or directly to the administrative bodies responsible for the environmental protection. The MoE and city hall are obliged to respond on the grievances, which have been received from the population or other interested parties in accordance with the requirements of the

Administrative Code of Georgia. The PIU will facilitate the response through implementing a project specific grievance redress mechanism. During the public consultation process, the PIU will inform the stakeholders and public that the PIU is responsible for environmental compliance and grievance redress. PIU will provide at the public consultation meetings and on the MDF web-site the contact details of the persons responsible for grievance collection and response. Upon the receiving the grievance (in written or oral communication) the PIU will execute following actions:

(i) Send its representatives to check the claims and monitor the situation;
(ii) Involve MoE and City Hall when and where appropriate;
(iii) Receive expert's conclusion (from MDF personnel, independent experts or MoE/City Hall experts);
(iv) Submit to the constructing company and operator in writing request on corrective measures;
(v) During 10 days after receiving the grievance, inform the affected person or persons in writing about the expert's decision and applied corrective measures.
(vi) If the affected person is not satisfied by the decision, they may present further information in support of new case. The subsequent decision of the PIU/MOE and Municipality is considered finally.

87. If the affected stakeholder or person is not satisfied by the response of PIU or administrative bodies, the grievance may be directed to the court.

6. Environmental Management Plan

a. Institutional Framework for EMP Implementation

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

89. During operation phase to follow EMP and good practices is obligated Road department of Georgia.

b. Reporting on EMP Implementation

90. The contractor, through the environmental specialist on the team, shall prepare monthly status reports on the EMP implementation throughout the construction period.

91. The technical supervisor consultant or engineer 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 content.

92. MDF will ensure that monthly reports from the contractor and from the technical supervisor are made available for the environmental specialists of ADB promptly upon their arrival in MDF administration.

93. The EMP generally specifies monitoring reports every 6 months during construction of the project road. The EMP monitoring report can be a single document including all items listed

in chapter 10.1. For each item the report should include a summary of the pertinent government regulations and permits, specifying progress made during the reporting period with numerical data, identifying items not complied with, and providing reasons of noncompliance. The EMP monitoring report must be prepared by the local environmental control organization with the assistance provided by an independent monitoring agency.

c. Remedies for EMP Violation

94. Road Department of Georgia, as the 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.

d. Environmental Management Plan

95. The environmental management plan (EMP) should be constantly updated in compliance with the laws of Goergia, as new requirements are raised concerning environmental protection and restoration. The EMP identifies actions for environmentally sound implementation of the Project through avoidance and/or mitigation of adverse effects..

96. The EMP, presented in chapter 10 has the following objectives:

(i) To meet the requirements of Georgian legislation and ADB Safeguard Policies requirements for environmental restoration and mitigation of adverse effects;
(ii) To identify adverse impacts on the environment due to operation of project areas;
(iii) To give instructions concerned for environmental protection, restoration, and mitigation of negative environmental effects;
(iv) To serve as a reference document for the environmentally sound implementation of the Project.

97. The constructor will monitor and measure the progress of implementation of the EMP. The extent of monitoring activities will be commensurate with the project's risks and impacts. In addition to recording information to track performance, the constructor will undertake inspections to verify compliance with the EMP and progress toward the expected outcomes.

7. Conclusion and Recommendation

98. The presented IEE document clearly shows that there would be positive as well as negative impacts on environment during construction and regular operation phases. The document describes mitigation measures for all negative impacts on environment together with related expenses that includes implementation of the mitigation measures as well as monitoring costs. Despite some negative impact, which require permanent monitoring and precise implementation of mitigation measures, the benefit from the project greatly exceeds the negative impact.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. Introduction

99. This chapter presents a review and analysis of the environmental and resettlement legislation of Georgia and the procedures for ensuring full compliance with ADB safeguard policy and the ADB environmental assessment and participatory resettlement process guidelines in the implementation of the project which will be financed under on ADB loan. It describes existing Georgian environmental regulations relevant to the project, provides guidance on the measures required for ensuring consistency with environmental assessment and makes reference to institutions at the local and national levels responsible for issuing permits, licenses, and enforcing compliance of environmental standards**B.**

B. Environmental regulations

a. Legislation and Administrative Structure in Georgia

i. Administrative Structure

100. Ministry of Environment Protection and Natural Resources (MoE). MoE has the overall responsibility for protection of environment in Georgia. The Service of Licenses and Permits of MoE is responsible for reviewing EIAs and for issuance of the Environmental Permits. The MoE Inspectorate is responsible for compliance monitoring, including monitoring of construction activities and auditing of all kind of entities. Regional services of MoE are involved during agreement on Terms of Reference on architectural design of a project and in commissioning of completed facilities. The Ministry of Environmental Protection and Natural Resources of Georgia (MoE) is the main state body pursuing state policy in the sphere of environment. Their functions for regulating economic or development activities with regard to environmental protection include:

(i) Issuing permits for project development (Environmental Impact Permit);
(ii) Setting emission limits and issuing surface water intake and discharge consents;
(iii) Inspection of operating plants;
(iv) Responding to incidents and complaints;
(v) monitoring air pollution and noise levels (especially near residential areas);
(vi) Regional services of MoE will agree upon sites for disposal of spoil and construction wastes.

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

102. For projects, that do not require a Construction Permit, the Environmental permit is issued by the MoE on the ground of State Ecological Expertise. State Ecological Expertise is carried out by MoE upon official submission of Environmental Impact Assessment (EIA) prepared by project developers.

103. For projects requiring a 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 is

subject to the consent of the MoE in the 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 an 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 proceedings initiated for the purpose of permit issuance, in accordance with Georgia's Law on Licenses and Permits (2008). 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 for the EIA study) is carried out by the project implementing agency and its consultants (in this case Municipal Development Fund (MDF) and its consultants). Scoping and screening do not represent mandatory procedures according to Georgian legislature although review of scoping/screening outcomes and agreement is considered a desired practice.

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

105. The Ministry of Economic Development (MoED). MoED is responsible for carrying out the review of technical documentation (including conclusion of state independent experts) and issuing Permits on Construction for projects classified as the projects of State Importance, as well as for supervision over constructing activities. 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.

106. The Municipal Development Fund of Georgia (MDF).MDFis a Legal entity under public law with the aim to promote the institutional and financial strengthening of the local self-governing bodies, investments in local infrastructure and services and sustainable progress of the principal economic and social services for the local population (communities).

107. The Fund is responsible for managing the finances received from central and local budgets, international financial institutions and other donors, and proceeds gained through the Fund loans as principal and interest amounts used to finance local and regional infrastructure and investment projects and appropriate technical assistance in the field of service.

108. MDF, within the limits of the programs accomplished by it, is responsible for purchasing the projects/plans and EIA research, as well as building and rehabilitation works of the municipal infrastructure. During the deals of purchase, the Fund is obliged to follow the legislation of Georgia under the established rule and by observing the environmental and social requirements of donor organizations. MDF is responsible for proper consideration of the environmental problems within the limits of the accomplished projects.

109. In particular, the functions of MDF include considering the EIA and environmental management plans of the accomplished projects. In addition, the Fund evaluates the degree of consistency of the contractor's activity with the environmental management plans, EIAs, environmental standards and other obligations.

110. The domestic resources of MDF are sufficient for the administration and general environmental control of projects. In case of necessity, aiming at performing the environmental monitoring of specific projects, MDF will purchase proper services within the limits of a single project for technical-economic and environmental supervision.

ii. Constructing Contractor

111. After appointment all Constructing Contractors should provide Constructing Contractor's Environmental Management Plan (EMP) developed on the basis of the EEI for the project. The necessity to develop Contractor/s management plan is normally fixed in the Construction Contract. The Constructing Contractor has the following obligations:

(i) to employ Environmental consultants (persons or company) responsible for developing and implementing the construction phase EMP and for provision of corresponding information to MDF;
(ii) to develop, if required, a Spoil and Rock Disposal Plan and Construction Waste Disposal Plan agreed with the MoE and its regional services;
(iii) to develop, if required, Reforestation and/or Biorestoration Plan or Compensation Plan agreed with the MoE (Forestry department; Biodiversity department);
(iv) Constriction Schedule;
(v) The EMP implementation costs should be included into the construction budget.

112. The Contract should also indicate that the Spoil and Rock Disposal Plan, as well as the Reforestation Plan, should be agreed with the Regional Services of the MoE, while the other chapters of the Constructing Contractor's Environmental Management Plan should be reviewed and accepted by MDF.

iii. Other Responsible Governmental Institutions:

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

114. Management Unit for Food Safety and Risk Analysis of the Ministry of the Agriculture (MUFSRA). MUFSRA is responsible for implementation of complex sanitary protection measures in the case of identification of burial sites during earthworks. Information about suspicious burial sites should be delivered to the "MUFSRA" by the Constructing Contactor (field environmental officer).

b. Framework Legislation

115. The basic legal document in the country is "The Constitution of Georgia", which was adopted in 1995. While the Constitution 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.

116. Article 37, Part 3 states that "any person has the right to live in a healthy environment, and 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."

117. 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.

118. Legislative execution of constitutional requirements in the sphere of environmental protection is implemented through the framework “Law on Environmental Protection” (1996, as amended) and the set of specific laws developed on its basis. The framework law regulates 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. It 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 a 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. Below the environmental regulations most relevant to the project are summarized.

119. Legislation Related to Environmental assessment and 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 2008), and (iii) The Law on Ecological Examination (EE) 2008.

120. The Law on Licenses and Permits 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).

121. The Laws on Environmental Impact Permit and on State Ecological Expertise integrate all the amendments introduced in legislation of Georgia during recent years.

122. The Law of Georgia on Environmental Impact Permit determines the complete list of the activities and projects subject to ecological expertise (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.

123. Under the “activities” subject to the ecological expertise the law includes 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 expertise and permit.

124. If the activity included in the list in clause 4 p.1 also requires a Construction Permit, the administrative body responsible for issuance of the Construction Permit ensures involvement of MoE, in the administrative procedures. In such cases the MoE issue as the conclusion on the Ecological Expertise of the project based on the documentation provided to MoE by the administrative body issuing the Permit. Compliance with the conditions of the Conclusion is obligatory for the project proponent. The conditions of the Conclusion on Ecological Expertise is a part of conditions of the Construction Permit.

125. 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, mitigation measures and the

approach to the environmental study (scoping) are being carried out by the project proponent in consultation with MoE.
Public Consultation Procedures

126. The 6th 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:

127. According to article 6, a 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).

128. The project executor will publish the information on the planned activity before the conducting of public review. The information will be published in central mass media, as well as in the newspapers in administrative territorial office (if any) of the region, where the activity is planned.

129. The announcement must contain the following information:
- (i) Goal, title and place of the planned activity;
- (ii) Location of the agency where the interested subjects will be able to familiarize
- (iii) themselves with the documents associated with the activity (including reports on
- (iv) environmental impact);
- (v) The deadline for submittal of considerations;
- (vi) Place and time for public review.

130. The executor will:
- (i) Provide EIA hard copy and electronic version to the administrative agency, that issues permission in a week after publication;
- (ii) Accept and consider written notes and considerations provided by citizens in 45 days after the date of evaluation publication;
- (iii) Conduct public review of the planned activity no later than in 60 days after the publication of the announcement;
- (iv) 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;

131. Reviews will be conducted in a public way and any citizen will be able to attend it.
Public review will be conducted at the region administrative center, where the activity is planned.

i. Official Submission of EIA to MoE

132. 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 location plan of the planned activity (with the indication of distances);
(c) Volume and types of the expected emissions (a technical report of inventory of the stationery sources of pollution and emitted/discharged harmful substances and projections of maximum permissible concentrations of emitted/discharged harmful substances (in 4 copies);
(d) A brief description of the activity (as a non-technical summary);
(e) A statement about any 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.

ii. Issuance of the Permit on Environmental Impact

133. 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.

c. Other Environmental Laws

134. **The Law on the Environmental Protection Service (Agency**). In accordance with the 'Law on the Environmental Protection Service of 2008, an environmental protection control system has been established to ensure the following: (a) state control in the field of environmental protection and ecological systems safety, (2) observance of the proper laws by the subjects of regulation, (3) population's trust in the mentioned system and in state organs, generally in respect of performance of state obligations and transparency in the field of environmental protection. Under the same Law, there has been an environmental protection agency established (on the base of a former environmental protection inspection) and the functions of its employees specified. In particular, they are authorized to accomplish an environmental inspection of the objects of regulation (physical and legal entities, state authority and local self-governing bodies) and monitoring of their activities. Besides, the prerogative of the environmental protection agency is to calculate the damage to the environment to compensate it to the state, put forward the requirement to the objects of regulation to compensate the damage, and in case of non-meeting such a requirement, file a proper appeal before the court.

135. For the road project, a subject of inspection and monitoring may be the process of building (legal use of resources; environmental pollution, noise and vibration, etc.) and exploitation-related activity (waste management, emissions; safety etc.).

136. **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:

137. 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);

138. 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);

139. 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.

140. Types of harmful human impact include:
- (i) introduction of pollutants into the ambient air;
- (ii) radioactive impact on ambient air;
- (iii) ambient air pollution with micro-organisms and microbial toxins;
- (iv) physical impact of noise, vibration, electromagnetic field etc on ambient air.

141. Types of ambient air pollution are specified:
- (i) emission of pollutants into the ambient air from stationary pollution source;
- (ii) emission of pollutants into the ambient air from mobile sources of pollution;
- (iii) emission of pollutants into the ambient air from non-point sources of pollution;
- (iv) emission of pollutants into the ambient air from small-scale sources of pollution.

142. According to the Article 29^1, 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.

143. 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.

144. Registration of emissions from stationary pollution sources comprises:
- (i) Self-monitoring of emissions;
- (ii) State emission registration system.

145. 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:

(i) Emission measurements (assessment);
(ii) Registration of emissions;
(iii) Reporting of emissions.

146. 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.

147. 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.

148. 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 sensitive ecological areas.

149. 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:

150. 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.

151. 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’.

152. 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.

153. 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).

154. 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:

(i) Disturbance or any other changes of the natural ecosystems
(ii) Demolition (destroy), arrest, disturbance, damage (invalidation) of any natural resource with the purpose of its exploitation or any other purpose
(iii) Damage of the natural ecosystems or species by reason of the environmental pollution
(iv) Bringing and breeding foreign or exotic species of living organisms
(v) Bringing explosives or toxic materials to the area.

155. 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.

156. 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.

157. 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.

158. The Red List of Georgia was approved by the **Presidential Decree No. 303 'On approving the Red List of Georgia' (May 2, 2006).** In case when the road rehabilitation project is to be accomplished within the resort zone 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.

159. 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 web site the clauses, which may be useful to estimate the damage within the limits of the project.

160. Article 2. The rule to estimate the damage caused by the harmful anthropogenic action on the atmospheric air
161. Article 3. The rule to estimate the environmental damage caused by the soil pollution
162. Article 4. The rule to estimate the environmental damage caused by the soil degradation
163. Article 5. The rule to estimate the environmental damage caused by illegal action with forest resources
164. 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
165. Article 7. The rule to estimate the damage caused by damaging the fish reserve and other biological forms
166. Article 8. The rule to estimate the damage caused by illegal acquisition of the animal life objects
167. Article 9. The rule to estimate the environmental damage during the fossil exploitation
168. Article 10. The rule to estimate the environmental damage caused by the pollution of water resources.

d. Environmental Standards and Norms

i. Environmental Quality Regulations and Standards

169. Within the context of a road project, environmental quality standards and norms are of primary importance. They define the quality of ambient air, admissible levels of surface water pollution and measures for their protection including zones of sanitary protection. The maximum admissible levels of air and noise pollution are also a certain importance to the stage of building. 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).

170. 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 3 Maximum Admissible Concentration of Pollutants (MAC) in Ambient Air mg/m^3

N	Substance	N according to CAS	Formula	MAC (mg/m^3)		Class of harmfulness
				Maximum fugitive	Average Daily	
1	2	3	4	5	6	8
6	Nitrogen (IV) Dioxide	10102-44-0	NO_2	0.085	0.04	2
111	Sulfur Dioxide	9/5/7446	SO_2	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

171. Noise Standards. The Georgian standards for noise control are approved by the Decree of the Minister for Health, Labor 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 4 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

ii. Construction Permits

172. Terms and procedures for obtaining Construction Permit, as well as issues related to the State supervision are mostly covered by the following legal acts:

(i) The Law of Georgia on Construction Permit (2004);

(ii) Government Decree No 140 on the Rules and Conditions for Issuing Construction Permit (2005) with amendments The Law on State Supervision over the Architecture and Construction Related Activities (1997) with amendments.

173. According low small scale auxiliary buildings, also rehabilitation and restoration activities do not required a construction permits.

174. If the construction is carried out by a Ministry of the Government or its structural unit, the preparation and agreement with the authorities of the project documentation should comply with the requirements stipulated in Decree No 101 of 2007. In particular, the project documentation and its review procedures should comply with the requirements set forth for phase I, II and III of the permitting cycle which are as follows:

Phase I. Pre-Design Stage

- Confirmation of the land plot ownership and preparation of related documents;
- Agreement on SoW and ToR for the Architectural Design with the Architectural Department of local administration;
- Preparation of the Design in accordance with the aforementioned SoW and ToR.

Phase II. Consent of the Architectural Department of local administration

Phase III. Application for acquiring Construction Permit and permitting procedures

- **Pre-Design Phase**

175. To obtain a Construction Permit the project proponent should provide to Ministry of Economic Development (MoED) documents confirming land plot ownership or right for land use, comprising extracts from the State Register or agreement with the land owner. This is relevant also for the construction activities to be carried out by central or local governmental bodies.
Terms of Reference for Architectural Design is a complex set of requirements determined by normative acts, which defines:

(i) Destination (residential building; industrial etc.);
(ii) Parameters (number of floors, dimensions etc.);
(iii) Layout;
(iv) List of Technical Requirements - environmental, technical and organizational conditions for design and construction. Each of these conditions should be agreed with the appropriate service agencies and should be supplemented the technical documentation.

176. Terms of Reference for Architectural Design should comprise requirements related to urban development planning; environmental protection and hygiene and sanitary safe conditions; protection of cultural heritage and historical sites etc. ToR for the architectural design should be issued by the Architectural Department of the local administration and Project Design documentation should be prepared by the project proponent in accordance with this ToR.

- **Design Phase**

177. Designs should be prepared in accordance with all requirements set forth within the Terms of Reference for Architectural Design and in compliance with the relevant design and construction standards. Design should be cleared by the Architectural Department of the local administration. If construction is to be carried out in a zone of cultural heritage protection, consent of the Ministry of Culture, Monument Protection and Sport is also required.

- **Phase III. Construction Permit**

178. If the project is to be implemented in area with special regime, appropriate consent of the relevant governmental body is required. This requirement is relevant for:

(i) Protected areas;
(ii) State border zone;
(iii) Sanitary protection zones of resorts;
(iv) Coastal zone;
(v) Right of Ways of highways, railways, pipelines and electro-transmission lines;
(vi) Sanitation-protection zones of water supply headwork's, water reservoirs, hazardous waste disposal facilities etc;
(vii) Zone of historical or cultural heritage protected in accordance with the law of Georgia on Cultural Heritage Protection.

179. The 'Law of Georgia on Cultural Heritage' was approved in 2007. Article 14 of the Law specifies the requirements for 'large-scale' construction works. A decision on career treatment and ore extraction in Georgia, as well as on construction of an object of a special importance based on the positive decision of the Ministry of Culture, Monument Protection and Sport of

Georgia. The conclusion is basis on archeological research carried out by the entity wishing to conduct the ground works. That entity is obliged submit to the Ministry documentation about the archeological research of the area in question. This should include field-research and laboratory works. If an archeological object identified in the area, the conclusion of the archeological research should contain the following information: (a) a thorough field study of the archeological layers and objects identified in the area by using modern methodologies, (b) recommendations about conservation of the identified objects and planning of the building activity, on the basis of the archeological research.

C. Environmental and Social Requirements of the ADB

1. The Asian Development Bank's (ADB) Safeguard Policy ADB Environmental Guidelines

180. All projects funded by ADB must comply with ADB Safeguard Policy Statement (2009). The purpose of the Policy is to ensure that the projects undertaken as part of programs funded under ADB loans are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards.

181. Safeguard policies are generally understood to be operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process.
ADB's safeguard policy statement (SPS) sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

(i) The Involuntary Resettlement Policy (1995);
(ii) The Policy on Indigenous Peoples (1998), and
(iii) The Environment Policy (2002).

182. All three safeguard policies involve a structured process of impact assessment, planning, and mitigation to address adverse effects of projects throughout the project cycle. The safeguard policies require that (i) impacts are identified and assessed early in the project cycle; (ii) plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts are developed and implemented; and (iii) affected people are informed and consulted during project preparation and implementation. The policies apply to all ADB-financed projects, including private sector operations, and to all project components.

183. Affected people are consulted during project preparation and implementation and information is disclosed in a form, manner, and language accessible to them. Safeguard plans are disclosed to the general public and the information is updated at various stages in the project cycle.

184. ADB is committed to the principles of host-country responsibility for measures to mitigate adverse environmental and social impacts. ADB in funded projects shall therefore comply with host-country laws, regulations and standards, as well as requirements by which the host country is bound under international agreements.

a. EIA and Environmental Screening under ADB Guidelines

185. ADB carries 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 resources required for the safeguard measures; and (iii) determine disclosure requirements.

186. 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 (financial intermediary).

(v) **Involuntary Resettlement[4].** 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.

187. Indigenous Peoples[5]. ADB will screen all projects to determine whether or not they have potential impacts on Indigenous Peoples. For projects with impacts on Indigenous Peoples, an Indigenous Peoples plan will be prepared.

188. 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:

[4] Involuntary Resettlement involves physical displacement (relocation, loss of residential land, or loss of shelter) or economic displacement (loss of land, assets, access to assets, income sources, or means of livelihoods) as a result of (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas, including full or partial, permanent or temporary losses and involuntary restrictions.

[5] Indigenous Peoples refers in a generic since to a distinct, vulnerable, social and cultural group possessing the following characteristics: i) self-identification as members of a distinct indigenous cultural group and recognition of this identity by others; (ii) collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories; (iii) customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and (iv) a distinct language, often different from the official language of the country or region.

(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) (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.

b. Environmental Impact Assessment

189. EIA evaluates the potential environmental risks and impacts of a specific project in its area of influence, examines alternatives to the project, identifies ways of improving project selection, sitting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts. EIA includes the process of mitigating and managing adverse environmental impacts during the implementation of a project.

190. According the ADB policy EIA should:

(i) Be initiated as early as possible in project development and be integrated closely with the economic, financial, institutional, social, and technical analyses of a proposed project;
(ii) Resettlement, indigenous peoples and cultural Property, and trans-boundary global environmental aspects;
(iii) Also take into account specific host- country conditions – the findings of environmental studies, National Environmental Action Plans, national legislation, the capabilities of the entity implementing the project, as they relate to managing environmental and social impacts, and obligations of the country under relevant international environmental treaties and agreements.

c. Public consultation

191. 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.

192. For policy application, meaningful consultation is a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

193. According the ADB policy public consultation process should:

(i) Describes the process undertaken during project design and preparation for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders;
(ii) Summarizes comments and concerns received from affected people and other stakeholders and how these comments have been addressed in project design and mitigation measures, with special attention paid to the needs and concerns of vulnerable groups, including women, the poor, and Indigenous Peoples; and
(iii) Describes the planned information disclosure measures (including the type of information to be disseminated and the method of dissemination) and the process for carrying out consultation with affected people and facilitating their participation during project implementation.

D. Comparison of the National legislation and ADB requirements

194. The above accounts of national environmental low and ADB policy indicate that the two systems are similar but then there are certain aspects in which ADB policy is more demanding or specified than the Georgian procedure. The main differences are as follows.
The Bank's guidelines provide a detailed description of procedures for screening, scoping and conducting EIA and explain a complete list of stages, which are not specified under the national legislation.

195. Considering ecological risk, cultural heritage, resettlement and other factors, the Bank classifies projects supported by them under categories A, B, C and FI. However in the Georgian legislation, EIA is carried out only if a developer seeks to implement projects listed in the Law on Environmental Impact Permit. This list is compatible with the category A projects of the Bank classification. According to the Georgian legislation EIA is not required in other instances, while Asian Development Bank guidelines requires limited EIA or IEE for the B category projects, and an environmental review of projects that are not expected to produce environmental impacts (category C).

196. Georgian legislation does not specify the format of environmental management plans (EMPs) and the stage of their provision for projects requiring EIA and does not require EMPs for projects not requiring EIAs. The Asian Development Bank guidelines require EMPs for all categories of projects and provides detailed instructions on the content.

197. According to Georgian legislation MoE is responsible for monitoring of project implementation and compliance with the standards and commitments provided in the EIA, and the role of the EMP is less clearly is defined.. The PIU or "Project Proponent" is responsible for implementing "self-monitoring" programs for projects requiring EIA. In contrast ADB guidelines stress the role of EMPs, which are important for all categories of projects, and the Project Proponent (in our case – MDF) is required to ensure inclusion of a monitoring scheme and plans into EMPs. Monitoring of performance compliance against EMPs is important element of ADB requirements.

198. The national legislation also does not take into account the issue of involuntary resettlement at any stage of environmental permit issuance. The Georgian legislation considers social factors only in regard to life and health safety (e.g. if a project contains a risk of triggering landslide, or emission/discharge of harmful substances or any other anthropogenic impact). While the Bank's document establishes the responsibility of a Borrower for conducting an environmental assessment, the national legislation provides for the responsibility of a project implementing unit to prepare EIA and ensure public consultation.

199. The role of the Ministry is restricted to participation in EIA consultation and carrying out state ecological examination required for the adoption of a decision on issuing an EIA permit as established under the legislation of Georgia. Under ADB regulations ADB carry out project screening and categorization at the earliest stage of project preparation when sufficient information is available for this purpose, also according 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.

200. In regard with consultation: The Bank provides for consultations for A and B Category projects (at least two consultations for Category A projects) and requires a timetable of consultations from the Borrower. The national legislation until recently contained only a brief reference to this issue without providing real tools of its fulfillment. The amendments to the Governmental Decree On the Procedure and Conditions of Environmental Impact Assessment established the requirement of public consultation of the EIA, which obligates a developer (i) to ensure public consultation of EIA, (ii) publication of information, (iii) receive comments within 45 days, (iv) arrange consultation not later than 60 days from the date of publication, invite stakeholders and determine the place of consultation.

Table 5 Table of Activities and responsibilities in EIA for national law and ADB policy

	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 or borrower
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. Normally only one consultation for IEE
5	Final EIA	Consider all comments received during public consultations, incorporate accepted remarks and explain rationale when the comments are disregarded.	Consider all comments from Bank and public. Incorporate accepted public comments and explain rationale 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 requered	Publication of the final EIA in the project area and on ADB website.

E. Harmonization of the ADB and Georgian Legislation Requirements

201. In order to comply with the both regulations – the ADB and Georgian legislation – the content of the EIA should comprise issues required in both regulations, thus complementing each other. The EMPs should therefore be elaborated in details as required by the ADB regulations. The assessment of the stationary sources of emission (e.g. diesel generators) should be executed according to Georgian regulations: "Inventory of the Stationary Sources of

Emission" and "Approval of the Emission Limits". For the category a projects the first public consultation (requested by ADB guidelines but not by Georgian regulations) will be held at the Scoping stage. The second one will be executed according to Georgian requirements. Disclosure will be conducted as required by ADB.

F. International Conventions

202. This chapter briefly introduces the main features of key multilateral environmental agreements to which Georgia is a part:

1. The Rio Declaration and Agenda 21

203. Rio Declaration on Environment and Development often shortened to Rio Declaration, was a short document produced at the 1992 United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit. The Rio Declaration consisted 27 principles intended to guide future sustainable development around the world.

204. Agenda 21 is a programme run by the United Nations (UN) related to sustainable development. It is a comprehensive blueprint of action to be taken globally, nationally and locally by organizations of the UN, governments, and major groups in every area in which humans directly affect the environment.

2. United Nations Framework Convention on Climate Change Convention (UNFCCC) 1992, and the Kyoto Protocol (1997)

205. The United Nations Framework Convention on Climate Change (UNFCCC or FCCC) is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro from 3 to 14 June 1992. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

206. The treaty itself sets no mandatory limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. In that sense, the treaty is considered legally non-binding. Instead, the treaty provides for updates (called "protocols") that would set mandatory emission limits. The principal update is the Kyoto Protocol, which has become much better known than the UNFCCC itself.

3. Convention on Biological Diversity (CBD), 1992

207. The **Convention on Biological Diversity** (CBD), known informally as the **Biodiversity Convention**, is an international legally binding treaty that was adopted in Rio de Janeiro in June 1992. The Convention has three main goals:

(i) conservation of biological diversity (or biodiversity);
(ii) sustainable use of its components; and
(iii) fair and equitable sharing of benefits arising from genetic resources

208. In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

209. The Convention was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993.

210. 2010 is the International Year of Biodiversity. The Secretariat of the Convention on Biological Diversity is the focal point for the International Year of Biodiversity.

4. The Ramsar Convention on Wetlands (Ramsar, 1971)

211. The **Ramsar Convention** (**The Convention on Wetlands of International Importance, especially as Waterfowl Habitat**) is an international treaty for the conservation and sustainable utilization of wetlands,[1] i.e., to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the town of Ramsar in Iran.

212. 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.

213. The Ramsar List of Wetlands of International Importance now includes 1,869 sites (known as *Ramsar Sites*) covering around 1,836,000 km²,[1] up from 1,021 sites in 2000. The nation with the highest number of sites is the United Kingdom at 168; the nation with the greatest area of listed wetlands is Canada, with over 130,000 km², including the Queen Maud Gulf Migratory Bird Sanctuary at 62,800 km².

214. Presently, there are 159 contracting parties, up from 119 in 2000 and from 18 initial signatory nations in 1971. Signatories meet every three years as the Conference of the Contracting Parties (COP), the first held in Cagliari, Italy in 1980. Amendments to the original convention have been agreed to in Paris (in 1982) and Regina (in 1987).

215. There is a standing committee, a scientific review panel, and a secretariat. The headquarters is located in Gland, Switzerland, shared with the IUCN.

5. The Convention to Combat Desertification

216. The **United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa** is a Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.

217. The Convention, the only convention stemming from a direct recommendation of the Conference's Agenda 21, was adopted in Paris on 17 June 1994 and entered into force in December 1996. It is the first and only internationally legally binding framework set up to address the problem of desertification. The Convention is based on the principles of participation, partnership and decentralization - the backbone of Good Governance and Sustainable Development. It now has 193 country Parties to the Convention, making it truly global in reach.

6. The Basel Convention

218. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, usually known simply as the Basel Convention, is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). It does not, however, address the movement of radioactive waste. The Convention is also intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate.

219. The Convention was opened for signature on 22 March 1989, and entered into force on 5 May 1992. A list of parties to the Convention, and their ratification status, can be found on the Basel Secretariat's web page. Of the 172 parties to the Convention, Afghanistan, Haiti, and the United States have signed the Convention but have not yet ratified it.

7. Stockholm Convention

220. Stockholm Convention on Persistent Organic Pollutants is an international environmental treaty that aims to eliminate or restrict the production and use of persistent organic pollutants (POPs).

221. In 1995, the Governing Council of the United Nations Environment Programme (UNEP) called for global action to be taken on POPs, which it defined as "chemical substances that persist in the environment, bio-accumulate through the food web, and pose a risk of causing adverse effects to human health and the environment".

222. Following this, the Intergovernmental Forum on Chemical Safety (IFCS) and the International Programme on Chemical Safety (IPCS) prepared an assessment of the 12 worst offenders, known as the *dirty dozen*.

223. The negotiations for the Convention were completed on 23 May 2001 in Stockholm. The convention entered into force on 17 May 2004 with ratification by an initial 128 parties and 151 signatories. Co-signatories agree to outlaw nine of the dirty dozen chemicals, limit the use of DDT to malaria control, and curtail inadvertent production of dioxins and furans.

III. PROJECT DESCRIPTION

224. The secondary road Zugdidi-Jvari-Mestia-Lasdili links the villages located in Zeda Svaneti region, Daba Mestia and Mestia with the region Zugdidi as well as with the trunk road Tbilisi-Senaki-Leselidze, which is the main road in the region. Maintaining of the existing axis and longitudinal profile is stipulated under the present project due to the fact that the project section is located in highland, on steep slopes of the river Enguri (making not feasible to change the road plan significantly). Minor changes are done on some sections to improve traffic safety conditions.

225. The roadbed shall be restored under the project to meet the technical requirements. The existing engineering structures repaired and restored, new engineering structures constructed if necessary. Construction of new road pavement instead of heavily damaged asphalt-concrete pavement is stipulated under the present project.

226. It should be noted that the present project will significantly contribute to the socio-economic development of Zeda Svaneti region and facilitate development of tourism infrastructure.

227. Design and bidding documents for the rehabilitation of secondary road Zugdidi-Jvari Mestia- Lasdili, section km 81-km 139 (part which is the presented project) were carried out by Transproject Ltd based on Agreement signed with State Department of Roads of Georgia[6].

228. The project section is divided into 6 lots in accordance with the Terms of Reference. In this document presented 3 following sections of the secondary road Zugdidi-Jvari-Mestia-Lasdili:

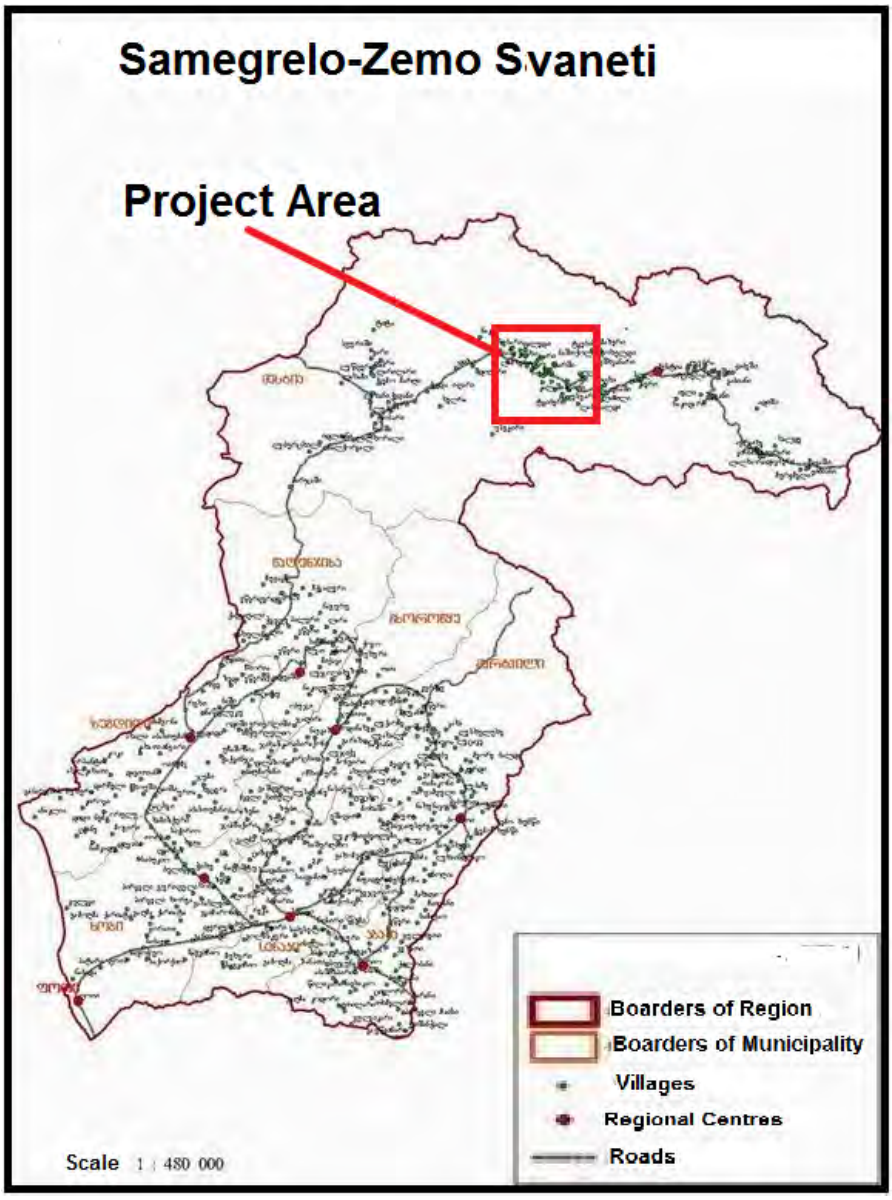
(i) Section 1: Km.100 – Km 110;
(ii) Section 2: Km.110 – Km 115;
(iii) Section 3: Km.117 – Km 120

229. Road pavement structure is changed in accordance with the requirements set forth in the Terms of Reference. Instead of two-layer asphalt-concrete pavement (thickness 6+4 cm) and crushed aggregates (0-40 mm, thickness 16 cm) stabilized with cement and bitumen emulsion, it is stipulated to construct the pavement of reinforced cement-concrete thickness 22 cm on the base of crushed aggregates (0-40 mm) thickness 25 cm under the present project.

230. Technical norms applied in the design are as follows:

(i) Category of road - IV;
(ii) Width of road bed - 7.0 - 8.0 m;
(iii) Width of carriageway - 6.0 m;
(iv) Width of shoulder - 0.5-1.0 m;
(v) Pavement type - cement-concrete.

[6] Agreement with State Department of Roads of Georgia signed on 25.07.2008 and Terms of Reference issued on 11.02.2009.



Figue 4 Location of Project Area

A. Description of the Project Road Sections

1. Section Km 100-110

231. The existing and project road starts on the bench of the left slope of the right tributary of the river Enguri and goes along the right slopes of the river Enguri until the end of the gorge. The slopes are formed by clay-slates, with rare insertions of sandstone.

232. Clay-slates are easily weathered and contribute and are exposed on slopes. The weathered material (crushed stone with boulders, with loam fill) is gathered at the feet of slopes and the road is mainly constructed on crushed stone soil with loam fill up to 0-35%.

233. The road is located on the severely weathered (at the surface) bench of slope composed of clay-slates from PK 0+00 to PK 14+20. The front part of the slope on which the road structure is located is covered with slid crushed aggregates with boulders with loam fill. The slope is stable. Widening of road is possible at the expense of cutting into the slope. The slope shall becleaned, and benches constructed. The right side of the road is steep. Surface and slope water flow onto the carriageway on some sections. Those sections require restoration. The asphalt pavement remained on some sections, thickness 7-8 cm. The road is mainly paved with gravel and crushed aggregates.

234. Settlements and deformations are not detected on the road. The road is located on the bench of heavily weathered slope composed of weak loam from PK 14+20 to PK 17+60. The slope is covered with weathered material (crushed aggregates with loam fill), thickness 1 m at the surface. Widening of road is possible at the expense of cutting into the slope as the right slope is steep and the village Lakhamula is situated at the foot of the slope. Settlements and deformations are not detected on the road. The road is covered with gravel and crushed aggregates. The road is located on the bench of a stable slope composed of crushed aggregates with loam fill from PK 17+60 to PK 23+60. The weathered material of slope slides and is gathers along the road, at the foot of the slope and carriageway. There are some springs on the slope. Construction of water drains is required on such sections. Widening of road is possible at the expense of cutting into the slope. It is required to construct ditch-side benches. Thickness of asphalt concrete is 7-8 cm. Thickness of gravel and crushed aggregates is 25-30 cm.

235. The road is located on the weathered slope, composed of clay-slates from PK 23+60 to PK 25+10. The weathered material, containing crushed aggregates with boulders is gathered at the foot of the slope. Widening of road is possible at the expense of cutting into the slope. The carriageway is of gravel and crushed aggregates, thickness 25-30 cm. There are remains of asphalt pavement on the road.

236. The road is located on the bench of stable slope composed of weathered crushed aggregates with boulders and loam from PK 25+10 to PK 29+80. There are remains of asphalt pavement on the road thickness 6-7 cm .The carriageway is of gravel and crushed aggregates, thickness 25-30 cm.

237. The road is located on the bench of stable slope composed of heavily weathered clay and slates from PK 29+80 to PK 41+10. The weathered material collects at the foot of the slope. Surface and slope water flows on the carriageway. The right slope of the road is washed off. Cleaning of slope is required on the left side of the road. Construction of ditch-side bench is required. Restoration of washed off areas shall be done. There are remains of asphalt pavement on the road thickness 7-8 cm. The carriageway is of gravel and crushed aggregates, thickness 25-30 cm.

238. The road is located on the bench of slope composed of clay and slates, covered with weathered crushed aggregates with loam fill from PK 41+10 to PK 47+10. The weathered material collects at the foot of the slope, along the road.

239. The right steep slope of the road is washed off by surface and slope water which caused damage to the retaining wall at PK 46+80. The carriageway is narrowed. Widening of road is possible at the expense of cutting into the slope. There are remains of asphalt pavement on the road, thickness 7-8 cm. The carriageway is of gravel and crushed aggregates, thickness 25-30 cm. The road is located on the bench of heavily weathered slope, divided into blocks, composed

of clay and slates from PK 47+10 to PK 54+50. The weathered material collects at the foot of the slope, along the road. Crushed aggregates with boulders which slid from the slope gathered along the road.

240. Surface and slope water flows on the carriageway. The right steep slope is washed off. There are ruined sections, which causes narrowing of the carriageway. Cutting of slope is required as well as cleaning of slope and construction of ditch-side bench. There are remains of asphalt pavement on the road thickness 6-8 cm. The carriageway is of gravel and crushed aggregates, thickness 25-30cm.

241. The road is located on the bench of stable slope, covered with crushed aggregates and boulders with loam fill from PK 54+50 to PK 60+60 (village Kveda Lukha). Thickness of asphalt concrete pavement is 7-9 cm. The carriageway is of gravel and crushed aggregates, thickness 25-30cm.

242. The road is located on the bench of slope composed of weak weathered clay and slates from PK 60+60 to PK 67+60.

243. The road is located on the bench of the slope composed of glacier deposits from PK 67+00 to PK 77+60. The slope is steep and there is danger of landslide. Glacial drifts contain crushed stones with boulders and pebbles with loam fill. Slopes are intensively weathered. Screes of boulders happen on the carriageway. Surface water which occurs on the carriageway washes away the right side of the road. It is required to clean the slopes on the right side of the road as well as to construct the ditch and ditch-side bench. The carriageway is covered with crushed aggregates and gravel.

244. The road is located on the plateau from PK 77+60 to PK 83+20. The area is covered with crushed aggregates with boulders with loam fill. Surface water happens on the carriageway and causes cracks. There is a settlement on the road caused by water penetrating into sub-base from PK 82+40 to PK 83+00. Construction of ditch and drain pipe is required on this section as well as the construction of new road structure (in place of settlement).

245. The road is located on the bench of heavily weathered slope from PK 83+20 to PK 92+60. The slope is composed of clay and slates. The slope is covered with crushed stones and boulders with loam fill. The right slope is steep and is washed away by surface water. Surface water penetrates into the sub-base. Insignificant settlements are detected on the carriageway. Widening of the road is possible at the expense of cutting into the slope with the construction of ditch-side bench. The right slope shall be restored.

246. The road is located on the bench of slope composed of clay and slates from PK 90+60 to PK 92+30. There is a landslide on the slope. The part of landslide is active. The landslide is developed on the upper part of the right slope in the Enguri gorge. The profile of the erosive slope in the direction of the river bed is characterized as wavy-hilly. The relief is split by various erosive ravines, one of them 50-60 m deep. The sides are covered with layers of randomly distributed clay and slates with inter-layers of sandstone. There 5 steps of landslide generation.

247. The road is located on the third step of landslide body. The height of the ravine above the road is 100-130 m. The relief is hilly, it is cut into benches by stable and dynamic landslides. The slope is covered with sparse wood and shrubs.

248. The slope is slanted within 15-500. The upper part of the slope finishes with glacier with quite leveled crest and evident glacier formation on it. Further, on the slope down the road there are 3 landslide steps. The surface is slanted within 15-200. The surface is covered with shrubs and grass. Landslide is spread along 300 m along the slope, with the dynamic landslide body – 170 m. Geometry of landslide body is characterized as circus. The landslide body above the road is characterized as block-creeping, passing into creeping-plastic in the central part. It involves the part of road bed and a small section beneath (see photo 9). It is required to remove the active landslide body, to cut into the slope, cut the slope into benches and organize drainage of surface water. Construction of gabion crib is also required.

249. The road is located on the bench of stable slope from PK 92+30 to PK 98+00. The slope is composed of clay and slates, covered with crushed aggregates and boulders and loam fill. The weathered material gathers at the foot of the slope and along the road. The right side of the road is washed away by surface and slope water. Widening of road is possible at the expense of cutting into the slope. The slope shall be cleaned and ditch-side bench constructed. Restoration of washed away area is required on the right side of the road. Thickness of asphalt concrete pavement is 7-8 cm. The carriageway is of gravel and crushed aggregates, thickness 25-30cm. Settlements and deformations are not detected on the section.

250. The serpentine road is located on the bench of stable slope from PK 98+00 to PK 101+10. The slope is composed of clay and slates, covered with crushed aggregates and boulders and loam fill, thickness 1-1.5 m.

2. Sections KM 110-115 and Km117-120

251. The existing and project road is located on the right slope of the river Enguri. The slopes are formed by rocky clay-slates, with sandstone layers and the surface is covered with crushed aggregates and loams.

252. The serpentine road is located on the bench of stable slope from PK 101+10 to PK 107+20. The slope is composed of clay and slates, covered with crushed aggregates and boulders and loam fill, thickness 1-1.5 m.

253. On the right side of the road from K 103+90 to PK 104+20 settlement is detected (20-25 cm). The settlements are caused due to flowing surface and slope water into the soil of base. Because of ditch on the left side of the road is filled.

254. Prevention of road of water and structure of new pavement are required.The road is located on the weak weathered slope, composed of clay-slates from PK 107+20 to PK 114+0. The slope is composed of clay and slates, covered with crushed aggregates and boulders and loam fill. Widening of road is possible at the expense of cutting into the slope cleaning of slope and construction of ditch-side bench. The small settlements are detected on the right side of the road. It is caused due to flowing water into the soil of base. Removal of water and structure of new pavement is required.

255. There are remains of asphalt pavement on the road, thickness 7-8 cm. The carriageway is of gravel and crushed aggregates, thickness 25-30 cm.

256. The road goes through the territory of village Etseri from PK 114+00 to PK 135+00. The relief is flat. It is composed of clay with insertions of crushed aggregates and boulders.

257. Thickness of asphalt concrete pavement is 12-14 cm and in a sufficient condition. The carriageway is of gravel and crushed aggregates, thickness 25-30cm. Settlements and deformations are not detected on the section.

258. The road is located on the bench of slope composed of weak, heavily weathered clay and slates from PK 135+00 to PK 138+50. Due to weathering the piled crushed aggregates with boulders are gathered along the road and damages it. Because of flowing water into the soil of base settlements are developed on the section PK 136+10 Construction of pipe culvert, cleaning of slope and construction of ditch-side bench are required on this section of the road.

259. There are remains of asphalt pavement on the road thickness 12-14 cm and it is seriously damaged. The carriageway is of gravel and crushed aggregates, thickness 25-30 cm.

260. The road is located on the bench of the slope from PK 139+50 to PK 141+00. There is a landslide ,,Malatvibra" (Figure 5 and 6) on the slope. "Matlvibra" landslide section is located on the right slope of Enguri gorge, in the village Pari, km114. The slope has broken profile on this section. The relief is composed of morphological ridge above the road. The surface of the ridge is modified by Pleistocene age glaciers. The average slant of slope is 250-350, is covered with sparse wood and is insignificantly dissected with gullies. Three landslide steps are found on this slope, out of which the upper two steps are stable at present, whilst the third is active and borders the road. The step is characterized by frontal morphology and is situated along the slope. The landslide body is heavily moisturized and is characterized as fluidplastic.

Figure 5. Landslide ,,Malatvibra" (114 Km)

Figure 6. Landslide ,,Malatvibra" (114 Km)

261. Thickness of landslide disruption is up to 10 m, with surface slanted at 60-70%. Length of spreading of landslide body (in the cross-section) along the surface was 150 m in 1980. However, it increased up to 700 m in 2008, out of which 200 m are especially dynamic and active. The landslide process involved the road bed and the lower part of the slope, where crushed aggregates, clay and slates layers, which compose the landslide body, are displaced. Layers of clay slates in the landslide body are so severely displaced and disintegrated due to tectonic processes that main deposits passed into clay facies of black color. The ravine located in the north-west and bounding the landslide body is formed in the zone of tectonic disruption. There are springs of various debits in the dynamic and active landslide body.

262. We conclude that, resulting from active landslide processes, long-term mitigation measures will not be effective and therefore a number of prevention activities shall be carried out:-to plough active dynamic formations on the upper slope; the slope shall be given a stable slanting angle.

263. Surface and ground water shall be taken away from the landslide body so that the water will not saturate the lower slope. Road is located on the bench of stable steep slope composed of heavily weathered clay and slates from PK 141+00 to PK 151+35. The slope is covered with weathered material, containing crushed aggregates with insertions of boulders is gathered at the foot of the slope and along the road.

264. The ditch and ditch-side bench are constructed on the left side of the road. Thickness of asphalt concrete pavement is 10-13 cm and badly damaged and deformed.

265. The carriageway is of gravel and crushed aggregates, thickness 25-30 cm

266. The road is located on the bench of slope composed of heavily weathered, disrupted clay and slates from PK 161+50 to PK 166+40. The slope is covered with disrupted material, containing crushed aggregates and boulders with loam fill.

267. The slope is stable and undergoes weathering. The weathered material is gathered at the foot of the slope and along the road. The widening of the road is possible by cutting of slope as well as cleaning of slope and construction of ditch-side bench.

268. The small settlements are detected on the road. They are caused due to flowing surface and slope water into the soil of base. Structure of new pavement is required. Thickness of asphalt concrete pavement is 11-12 cm and badly damaged. The carriageway is of gravel and crushed aggregates, thickness 25-30 cm.

269. The road is located on the bench of slope composed of moraine sediment from PK 166+40 to PK 169+20, containing boulders with insertions of crushed aggregates and pebbles. The slope is stable.

270. Widening of road is possible at the expense of cutting into the slope cleaning of slope and construction of ditch-side bench. The right slope of the road is steep and stable. The existing right retaining walls are in good condition. The small settlements are detected on the road. They are caused due to flowing surface water into the soil of base. The ditch is filled and water runs on the road Thickness of asphalt concrete pavement is 10-12 cm and badly damaged The carriageway is of gravel and crushed aggregates, thickness 25-30 cm

271. The road is located on the bench of stable slope composed of heavily weathered clay and slates
from PK 169+20 to PK 177+10. Cleaning of slope and construction of ditch-side bench are required. Thickness of asphalt concrete pavement is 10-12 cm and badly damaged The carriageway is of gravel and crushed aggregates, thickness 25-30 cm. The settlements and deformations are not detected.

272. The road is located on the bench of stable slope composed of strong moraine sediment from PK177+10 to PK 185+10. The moraine sediment contains boulders with insertions of crushed aggregates and pebbles and loam fill. Thickness of asphalt concrete pavement is 12-13 cm and badly damaged The carriageway is of gravel and crushed aggregates, thickness 25-30 cm. The small settlements are detected on the road. They are caused due to flowing surface water into the soil of base. Because of ditch on the left side of the road is filled. Structure of new pavement is required.

273. The road is located on the bench of weathered slope from PK 185+10 to PK 194+10. The weathered material – crushed aggregates is gathered at the foot of the slope and fill the existing ditch. As a result the surface and slope water run along the road and the right slope is washed off. Due to water drainage small settlements are detected on the section, especially on the right side of the road. Cleaning of slope and construction of ditch-side bench is required on this section. Restoration of washed sites on the right side is foreseen by the project, as well as new structures shall be done on the sections the settlements are detected. Thickness of asphalt concrete pavement is 10-12 cm and badly damaged. The carriageway is of gravel and crushed aggregates, thickness 25-30cm.

274. The road is located on the bench of stable steep slope, covered with crushed aggregates and boulders with loam fill from PK 194+10 to PK 202+60 Small size settlements

are caused due to flowing surface water into the soil of base. Widening of road is possible at the expense of cutting into the slope cleaning of slope and construction of ditch side bench.

B. Existing and Project Structure

1. Section Km 100-110

275. There are 15 engineering structures on the project section:
- (i) 1 bridge at PK 94+67, 1x11.36 m;
- (ii) 6 reinforced concrete pipe-culverts;
- (iii) 7 reinforced concrete box-culverts;
- (iv) 1 steel pipe d=0.7 m at PK 91+26.

276. It is required to repair 8 culverts and 1 bridge under the present project; two reinforced concrete culverts hall be canceled. The reinforced concrete box-culvert at PK 27+20 requires extension by 2m, whilst water intake wells shall be constructed on the rest of the culverts; culvert heads and wings shall be elevated; portal wall shall be constructed.

277. The deformed steel pipe, d=0.7 m, L=14 m at PK 91+26 shall be replaced with the new steel pipe, d=1.02 m, L=12 m. Two reinforced concrete pipe-culverts, d=1.0 m, located at PK 41+65 and PK 53+98 and one box-culvert, sec. 1.0x1.0 shall be replaced under the present project, construction of reinforced concrete box-culverts is stipulated instead.

278. The bridge deck shall be removed on the bridge, new carriageway, deformations, sidewalks and railing constructed. Construction of reinforced concrete lower retaining walls shall be done on the approaches on the three sides under the present project.

279. Construction of 15 reinforced concrete culverts of various sections and steel pipe shall be done under the present project.

280. Construction of retaining walls of gabion boxes or reinforced concrete retaining walls on some sections shall be done under the present project to restore the road bed. Repair of the existing retaining walls shall be done as well. The structure of walls is adopted in accordance with Typical Design 3.503.1-67 calculated for 8 points of seismic activity. Five concrete retaining walls shall be repaired out of total amount of retaining walls existing on the project road, they shall be elevated, filled with stone and reinforced concrete casing shall be constructed on them.
- (i) Lower retaining walls with gabion boxes – 1015/3746.5 linear m/m3;
- (ii) Upper retaining walls with gabion boxes – 62/275 linear m/m3;
- (iii) Reinforced concrete upper retaining walls– 66/296 linear m/m3;
- (iv) Reinforced concrete lower retaining walls– 243/1130 linear m/m3;
- (v) Repair of the existing concrete retaining walls– 148/52 linear m/m3

2. Sections Km 110-115 and km 117-120

281. Reinforced concrete and steel culverts in an amount of 29 units are detected on this section of the project road:
- (i) 7 reinforced concrete pipe-culverts
- (ii) 20 reinforced concrete box-culverts and steel pipe
- (iii) 2 steel pipes d-0.7m

282. 20 culverts from 29 can be repaired-4 of them are pipe-culverts d-1.0m and 16 are box-culverts. They shall be cleaned, the damaged body and heads shall be removed and replaced with the new ones. Dismantling and installation of deformed sections of the culverts and covered slabs are foreseen by the project. As well as elevation of heads and wings with cast in situ concrete is required, whilst water intake wells shall be constructed on the rest of the culverts; The box-culvert at PK 183+98 requires extension by 6.2m; Concrete chute shall be constructed at PK 187+50.

283. Construction of stone riprap and cutting of bed are required on repairing culverts. Additionally construction of 4 box-culverts of various sections and 3 steel pipes d-1.0 m shall be done under the present project.

284. Totally 16 new culverts shall be constructed under the present project. Seven of them shall be constructed instead of existing ones. Three steel pipes from seven (d-0.7 m) are deformed. 1 reinforced concrete culvert and 3 reinforced concrete box-culverts are badly damaged and shall be canceled. New culverts shall be constructed instead of existing ones.

285. Repair of 6 existing retaining walls shall be done under the present project. They shall be elevated, and reinforced concrete casing shall be constructed on them, as well as damaged sections shall be removed and restored. The total length of walls is 188 L.m. New reinforced concrete retaining walls (length 2oo L.m) shall be constructed instead of damaged lower retaining walls existing on the project road (at 6 sections). The structure of reinforced concrete lower retaining walls is adopted in accordance with Typical Design 3.503.1-67 calculated for 8 points of seismic activity.

(i) Construction of lower retaining walls with gabion boxes 939/3010 L.m/m3
(ii) Construction of concrete lower retaining walls 92/87 L.m/m3
(iii) Construction of concrete upper retaining walls 259/431 L.m/m3
(iv) Construction of reinforced-concrete lower retaining walls 200/623.0 L.m/m3
(v) Repair of existing retaining walls 188/53.3 L.m/m3

C. Organization of Works

1. Introduction

286. Rehabilitation works shall be performed in conformity with active standards, norms, recommendations and instructions. Works shall be performed in accordance with typical technological diagrams as well as design specifications.

287. Works shall be carried out using overall mechanization and applying advanced methods of works organization performed by specialized teams, in order to reduce the period of performance and increase labor efficiency.

288. The owners of underground pipes and cables confined within the construction site shall be given corresponding notification concerning the commencement of works in order to avoid any damage to their property.

289. Works shall be performed so that to prevent traffic disturbance, on one lane and vice versa The construction site shall be supplied with the following: installation of indicating, warning and guiding road signs at both ends of the road section, installation of guide posts along the road section, 20 m each in order to fence the site. Works shall be temporarily stopped on the

road section provided that traffic safety procedures haven't been ensured (especially whilst blasting works) and shall not be resumed until traffic safety is ensured on one lane of the road.

290. Traffic control procedures and fencing of the construction site shall be done in accordance with relevant instructions throughout the whole performance period. Layout of corresponding works shall be agreed with the local representative of the Police.

291. The expected commencement and completion time of works as well as recommended sequence of execution are given in the time schedule. Composition of teams is given in a separate table. All materials, semi products and prefabricated structures required should correspond to the design requirements and to the requirements of corresponding standards and have corresponding certificates. Main construction materials required for the implementation of overall volume of works as well as machines and transport facilities are determined based on active regulations.

2. Preparation Works

292. Specialized work teams shall be ensured with qualified workers and machinery. The successful Contractor is responsible for ensuring machinery for works performance, as well as living conditions for the staff. Preparation of site shall be started prior to the commencement of works. Preparatory period comprises the following: reconditioning and fixing of route, dismantling of the existing parapets of special design with crane and transportation to the temporary production base for re-use, dismantling of damaged road signs and transportation to the production base as scrap metal, milling of the existing pavement, construction of pools for drinking water, relocation of 24 pipes, relocation of electric lines. Construction of pools for drinking water, relocation of pipes and relocation of electric lines shall be done by specialized teams.

293. The above mentioned works shall mainly be carried out mechanically.

3. Engineering Structures

294. The following works shall be performed upon the completion of preparatory works: repair and cleaning of culverts, construction of new culverts, repair of bridge over the Khipa, repair and construction of gabion and reinforced concrete retaining walls. Volumes of works of engineering structures are attached in corresponding Tables of Volumes of Works.

295. Start cleaning of culverts from outlet, clean the bottom of culvert from debris and mud and then start washing from inlet along the total length of culvert. Extension of culverts should be done with similar sections. Replacing of culverts requires removal of the existing pavement by pick-mattock and transportation of the removed material to sites specified in the project. Pit shall be excavated, crushed aggregates bed laid and compacted, base shall be constructed and culverts rings shall be placed into the pit with their following monolithing. New culvert heads shall be installed, waterproofing applied, soil backfilled and compacted, inlets/outlets strengthened in accordance with the project.

296. Marking of culvert axis shall be done prior to the construction of culvert. Start construction from outlet. Trench shall be excavated in layers by excavator along the total width. Pit shall be strengthened and treated manually; base shall be filled with crushed aggregates and compacted. Concrete shall be supplied in concrete mixer. Installation of precast elements is done by cranes. Culvert is filled with soil simultaneously from both sides in 15-20 cm horizontal

layers and compacted upon the completion of waterproofing. Pit shall be excavated and strengthened with timber whilst the construction of retaining walls. Prior to the construction of foundation the bottom of pit shall be cleaned up to the design level to avoid damaging structure of base deposits.

297. Construction of wall shall be followed by waterproofing of surfaces to be covered with soil and construction of longitudinal drainage. Fill the quarry stone and gravel soil behind the wall manually. Raising of the retaining wall requires: top surface of the wall shall be cleaned; wall body bored in the direction from the top with boring device, reinforcement bars shall be installed in boreholes and concreted. The wall shall be waterproofed at the contact areas with soil. Soil shall be filled behind the wall.

298. Construction of gabion walls requires that each gabion box shall be placed in its place indicated in the design with another box placed beside, which is connected to the previous one by wire. Covers shall be placed on gabion boxes after filling them with stones and they shall be tied to gabion walls by wire. The same sequence shall be applied whilst placing the proper quantity gabions and rows of gabions. Edges shall be interconnected.

299. Start repair works on the Khipa bridge on the first lane, keeping the traffic moving on the other lane and vice versa. The sequence of works is as follows: construction of retaining walls at the approaches, approaches shall be restored up to the required dimensions. The following shall be removed: damaged asphalt concrete pavement, concrete layer on the carriageway, reinforced concrete sidewalk blocks, socle and posts (loaded and transported to the dumpsite). Steel railing shall be cut and transported to the production base as scrap metal. The following shall be constructed: deformations joints, bridge deck, sidewalks and railings.

4. Road Bad

300. **At section I**. Excavation of soil in cut and ditches: with bulldozer - 133570 m3; with excavator - 82640 m3; construction of benches on fill slope - 410 m3; excavation of soil in ditches manually - 1230 m3; crushing of large boulders (blast holes) - 35m3; cleaning of road slopes of boulders, cleaning of extra soil in shoulders. Construction of hillside ditch, reshaping of road bed and slopes mechanically – 56490 m2.

301. **At sections II and III.** Excavation of soil in cut and ditches: with bulldozer - 32720 m3; with excavator - 115950 m3; excavation of soil in ditches manually - 1070 m3; construction of benches on fill slope - 610 m3; construction of concrete ditches – 452/172 l.m/m^3; Strengthening of ditches with “Reno” type mattresses- 210 l.m; Construction of drainage layer – 10730 m3; reshaping of road bed and slopes mechanically – 69850 m2. In order to carry out the works mentioned above, 17420 m3 rocky soil shall be removed requiring preliminary loosening with blast holes -10070 m3, powerful bulldozers at least 228 Kw – 7350 m^3. Excavation of cuts shall be done in the direction from the top to the bottom, in horizontal layers, along the total width. Excavated soil shall be hauled with dump trucks to the dumpsite.

302. Construction of ditches shall be done properly to avoid any of the water to penetrate into soil and cause deformation. Ditch slope shall meet design requirements; ditches of proper cross-sections shall be constructed in accordance with time schedule. Excavation of ditches in soft soil shall be done with excavator and manually, whilst processing of rocky soil shall be done with 1.5 m deep blast holes.

Excavation of cuts shall be done in the direction from the top to the bottom, in horizontal layers, along the total width. Excavate soil shall be hauled with dump trucks to the dumpsite.

5. BLASTING WORKS

303. Blasting of 3805 m3 rocky soil (31a) is required on the road Zugdidi-Jvari-Mestia-Lasdili km 101- km 110 and Pre-loosening by blasting of 10100m3 rocky soil (31a) is required on the road Zugdidi-Jvari-Mestia-Lasdili km 111-km 115 and km 117-km 120.

304. There are power lines located along the project road. The owners of the power lines shall be notified on blasting works, the works shall be agreed with them, and some representatives shall be present whilst performing the works. The requirements that may arise on their side shall be considered. Power lines shall be disconnected whilst performing of works.

Table 6 Blasting works stipulated in the design are as follows (section I):

N	Names of works	Meas. unit	Quantity	Notes
1	Blast holes charges in rocky soil.			
	depth – 0.5-1.0 m	m^3	6240	Soil 31[a]
	depth – 1.0-2.0 m	m^3	9360	Soil 31[a]
2	Blast holes in ditches depth – up to 0.5 m	m^3	2930	Soil 31[a]
3	Breaking of large boulders with blast holes	m^3	35	Soil 31[a]
	Total	m^3	18565	Soil 31[a]

Table 7 Blasting works stipulated in the design are as follows (section II and III):

N	Names of works	Meas. unit	Quantity	Notes
1	2	3	4	5
1	Blast holes charges in rocky soil.			
	depth – 0.5-1.0 m	m^3	3740	Soil 31[a]
	depth – 1.0-2.0 m	m^3	5590	Soil 31[a]
2	Blast holes in ditches depth – up to 0.5 m	m^3	740	Soil 31[a]
	Total	m^3	10070	Soil 31[a]

305. Composition of blasting works:
- (i) Boring of holes;
- (ii) Preparation of explosives;
- (iii) Charging and closing;

(iv) Installation of blasting network;
(v) Blasting.

306. Machinery and equipment:
(i) Compressor up to 10 m3/minute;
(ii) Bore hammer.

307. Materials
(i) Explosives;
(ii) Cable;
(iii) Electro detonator;
(iv) Bore bit

6. ROAD PAVEMENT

308. Construction of three types of pavement structure is stipulated in the design, which includes construction of sub-base layers and leveling layers of sand and gravel mix on various sections. Construction of crushed stone base course, cement concrete pavement and shoulders of sand and gravel mix is stipulated for all the three types.

309. Deliver sand and gravel mix in dump trucks to the site in order to apply it in the construction of leveling layer and sub-base. Then the mix shall be distributed with a grader, reshaped ensuring design cross-falls and compacted with pneumatic rollers preserving optimal humidity (variation at least 10%). Compaction shall be done from shoulders to the road center line. Each track should cover the previous track by 1/3. Number of passages should be determined on the site. Consider compaction completed when the track becomes invisible and no waves are observed on the surface.

7. ROAD FURNITURE AND EQUIPMENT

310. The following construction works shall be carried out: (i) Repair of junctions, construction of bus stop sites and shelters, (ii) installation of road signs, (iii) pavement marking and construction of barriers.

311. Posts for road signs shall be installed on footings prepared in advance by means of special devices in accordance with their layout. All road signs shall be covered by reflecting material. Road marking shall be carried out by special paint on clear surfaces by marking machine. Marking shall be done in the direction of traffic and no traffic is allowed on the marking up to its complete drying up.

312. Road furniture works shall be mainly performed mechanically

8. LABOR PROTECTION AND SAFETY

313. 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.

314. 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.

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

IV. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

A. Physical Resources

316. Georgia is a country in Caucasus, Eurasia, at the Black Sea coast. Russia borders Georgia from the North, Turkey and Armenia from the South and Azerbaijan from the South-East. Georgia is situated at the crossroad of South-East Europe and West Asia and it is a transcontinental country by its location although it is part of Europe by its socio-political situation and culture (Figure 8).

Figure 8 Location of Georgia on the crossroad of South-East Europe and West Asia

317. Territory – total area of the country is 69,700 km^2, total length of its borders is 1,771 km including 1,461 km land border (164 km with Armenia, 322 km with Azerbaijan, 723 km with Russia and 252 km with Turkey) and 310 km coastal border (Black Sea);

318. Nature – Georgia territory is largely mountainous, nature is diverse – from subtropics to Caucasus glaciers; the highest elevation is at Mt. Shkhara – 5,068 m and the lowest is black sea. Agricultural land is 16% of total territory of the country, pastures – 25%, forests – 34%. Main rivers are Mtkvari and Rioni.

319. Natural Resources: timber, hydropower, manganese deposits, iron ore, copper, minor coal and oil deposits; coastal and mountainous resorts.

320. Religious structure (according to the 2002 census): Orthodox Christian 84.0%, Muslim 9.9%, Armenian-Gregorian 3.9%, Catholic 0.8%, Jesuits 0.4%, Judaists 0.1% and etc.
Administratively there are 12 administrative units (Figure 9). Each administrative unit is divided into Municipalities (64 municipalities in total). According to the constitution territorial arrangement of the country should be defined after restoration of central authority on whole territory of Georgia.

321. Each municipality represents self-governing unit with homogenous physical-geographic conditions and defined natural boundaries as well as ethnic-cultural characteristics of population and historically established territorial-administrative function.

Figure 9 Administrative units of Georgia

322. The Zugdidi-Jvari-Mestia-Lasdili motor road section is located on the territory of Mestia Municipality in Samegrelo-Zemo Svaneti administrative region.

323. Samegrelo-Zemo Svaneti is located (Firure 9) in the West part of Georgia. The distance from Kolkhet'is Dablobi (Kolkhida Lowland), which is summer resort zone, to the highest and most difficult peaks for mountain-climbers – Ushba – is only 80 km and the distance to the world known settlement located at the highest elevation in Europe – Ushguli (Mestia Municipality) – is 120 km.

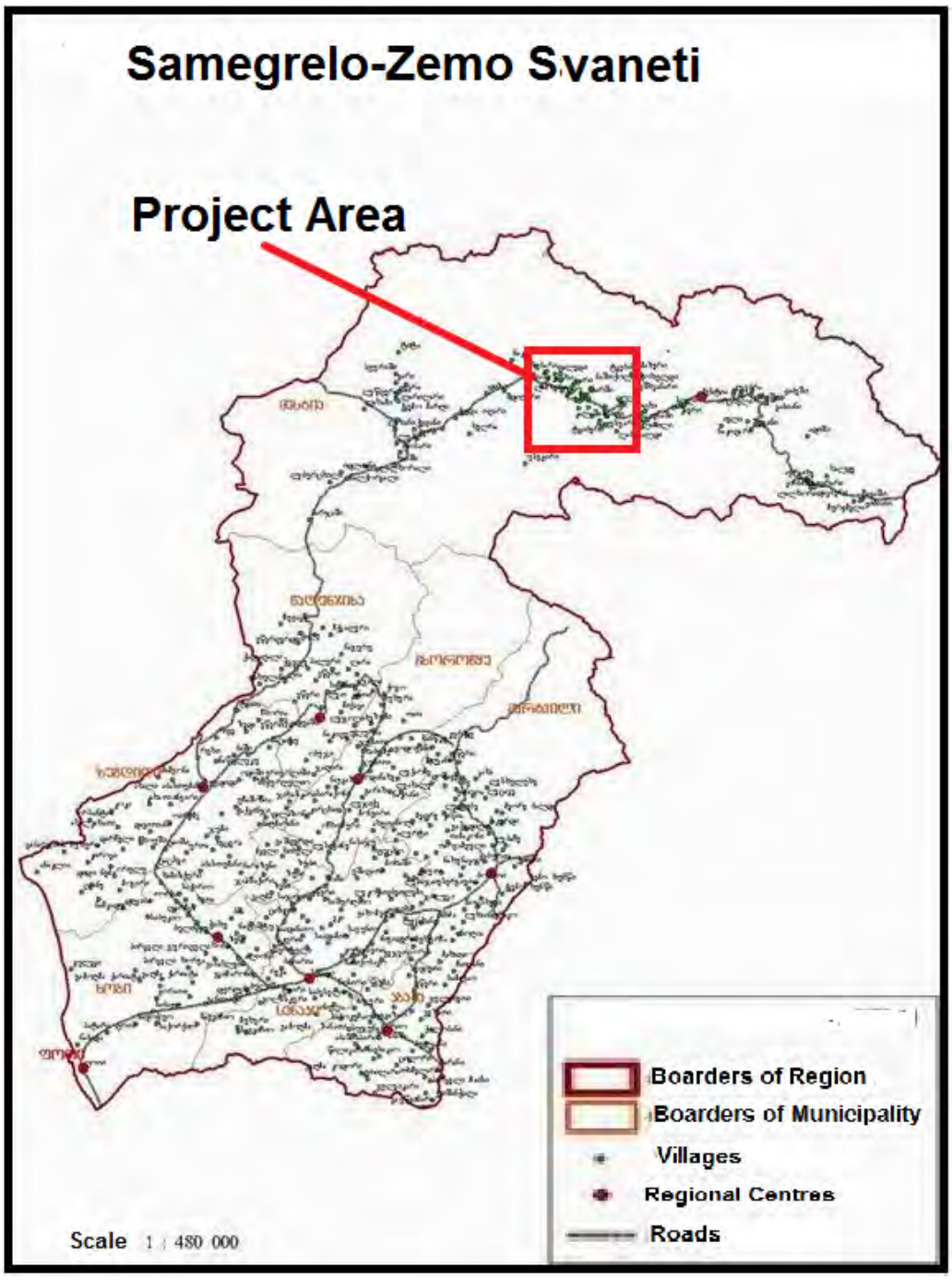


Figure 10 Samegrelo-Zomo Svaneti administrative unit

324. Mestia Municipality is located in the upper part of river Enguri basin. The Municipality is located at elevations from 800 m to 3600 m. The area of the municipality is 3,044.5 km^2, which is 4.4% of the territory of Georgia.

325. Main range of Caucasus Mountains borders Mestia Municipality from the North-East, Svaneti-Abkhazia range from the West and Svaneti Ridge from the South.

326. Mestia Municipality belongs to moderately cold mountain-meadow soil-climate zone as well as to mountain-forest and mountain-valley zone, so livestock breeding as well as fruit and vegetable growing is developed.

1. Atmosphere

327. Climate conditions of Zemo Svaneti are developed by its Geographic location. High-mountainous location and proximity of nival zone, and the fact that it is orthographically locked, with inverse of temperature, as well as the system of multi-story, high mountainous landscape belts from mountain-forests to nival zone have bearing on the climate. Complex climate conditions have bearing on livelihood of the population and on plethora of aspects of spontaneous geological processes. The description of the climate of the region is based on Mestia Metrological Station's data (8,9,10).

328. Average annual temperature of air is $+5,8^0$ (Mestia) $10,6^0$ (Khaishi), temperature of the coldest months (I, II, III, XII) fluctuates from $-1,4$-$2,7^0$ (XII) to $-4,9$-5^0 (I, II). The temperature during the warmest periods (VII, VIII, IX) is in the following range $10,3$-$13,1^0$. Direct and total radiation of sun at horizontal surface is as follows: in January 26/61 kvt/h/m^2 month; April _ 69/146; July _ 128/205; October _ 62/102 kvt/h/m^2 month. Total radiation on vertical surface changes correspondingly. It changes by exposition as follows: January: North _ 22 kvt/h/m^2 month; North-East North-West _ 22; East-West _ 35; South-East South-West _ 67, South _ 85; April: North _ 48, North-East North-West _ 61, East-West _ 80, South-East South-West _ 92, South _ 91 kvt/h/m^2 month; July: North _ 88, North-East North-West _ 206, East-West _ 104, South-East South-West _ 104, South _ 92; October: North _ 31 kvt/h/m^2 month, North-East North-West _ 37, East-West _ 58, South-East South-West _ 95, South _ 113 kvt/h/m^2 month. Absolute minimum air temperature is -35^0, absolute maximum $+35^0$, average minimum temperature is $-0,3^0$, and average maximum temperature is $+12,9^0$; Air temperature amplitude fluctuates within the following range $10,4$-$15,9^0$, and the fluctuation is the lowest in December and the highest in August.

329. Average annual relative humidity is 75% and daily amplitude of the relative humidity for the coldest month is _ 23%, and for the hottest months _ 45%; humidity coefficient is _ 2,0.

330. Average multi-year precipitation in Mestia is 970-992 mm, in Khaishi _ 1421 mm (7,8). It fluctuates in the range of 243-307 mm in summer and in the range of 226-429 mm in winter. Amount of precipitation is positively correlated to the elevation on the slopes of the mountainous ridges and reaches maximum amount at 2000 m and higher elevations. Number of annual precipitation days in Mestia is 168 days and 175 days in Khaishi. According to the Mestia metrological station's data daily maximum of precipitation is 105 mm, however heavy rain on June 17, 1982 amounted to 145 mm precipitation; something similar happened in July 1986, when precipitation in one day was 106 mm and in July 2004 – 100 mm. Heavy floods were developed at those times at river Enguri basin. Number of snowy days is 160 and the highest average of snow height for decades is 67mm. Water reserve of snow is 106 mm and weight of snow per m^2 is 1,47 kpa.

331. Average annual speed of wind is _ 0,9 m/s, and the highest and lowest speed of wind in winter is _ 1,4 m/s and 0,2 m/s respectively and in July _ 2,0 m/s and 0,8 m/s respectively. The highest speed of wind was identified in April and May (1,4 mm).

332. Annual number of clear and cloudy days is 120 and 32 respectively and they are distributed by months as follows: January 10,4/3,9; March _ 8,8/5,6; April _ 8,4/5,1; May _

6,3/3,7; June _ 6,4/2,8; July _ 7,8/2,1; August _ 9,5/2,1; September _ 10,2-3,3; October _ 12,1/4,8; November _ 13,0/4,5; December _ 14,3/4,9. Average annual number of foggy days is 6 and the highest is 13. Out of these 4 days comes in months X-III and 2 days in months IV-IX.

2. General Physical-Geographic Characteristic

333. Khaishi-Mestia motor road section entirely goes through river Enguri basin, which structurally belongs to central Caucasus unit and its nature is represented by extremely difficult high-mountainous landscape. This section of river Enguri morphologically represents high-mountainous, locked (so called Zemo Svaneti depression) depression, which is surrounded by Southern slopes of Caucasus's main ridge from the North and by Svaneti ridge from the South. Main ridge of Caucasus Mountains surrounding river Enguri basins depression is the highest crystal foundation stripped Horst-Anticlin. It's orthographic and Anticlinoria direction axis coincide each other. The Southern border of the morpho-structure morphologically is defined by sudden change of relief at the boundary of old crystal and meta-morphological complexes and slate type sets. "Main Overthrust" in the relief among the rivers Gvandri, Nenskri, Nakrisa and Dolri creates contrast; here huge monolith block like so called "Shtavreli Block" is crept on the layers of Jurassic and calcareous sediments, whose horizontal movement reaches 15 km.

334. Average absolute elevation of the main ridge is over 4,000 m, and maximum elevation is above 5,000 m. The number of mountain massives whose hypsometric indicators exceed 4,000 m reaches 36 and the elevation of the passes among them fluctuates in the following range: 3161-3866 m. This section of the Caucasus ridge is known as Svaneti Caucasus. Its length is about 125 km and its height gradually increases towards East and reaches maximum elevation at Shkhara massive, which is known as "Bexingi Kedeli (wall)". The highest peaks of the main ridge of Caucasus Mountains are here: Gistola, Tetnuldi, Shkhara, Namkvani, Ushba and etc. The longest glaciers with biggest area of the Southern slope of Caucasus mountains – Tsaneri, Tviberi, Adishi, Khalde, Ushba, Dolra, Shkhara and etc - are situated here as well; total area of the glaciers is 181.9 km^2.

335. Svaneti Caucasus Mountains has a lot of branches including Kodori, Shtavleri, Tsaldmili, Ushba, Namkodri, Kreta and etc. All those branches, whose absolute elevation gradually increases towards North and reaches maximum elevation at the top zone, where it is transformed into eternal snow and glaciers zone, represent divisors of river Rioni tributaries.

336. Character of the landscape of Svaneti Caucasus Mountains is defined by its layers' characteristics and hypsometric location. Its Northern part is formed by layers that are especially stable with regard to denudation-erosive processes; surface of the relief is modified by pleistocenic glaciers exertion, where tense freezing-mechanical exhaustion and nivation processes are undergoing on the background of glacier-nival climate. As a result rocky-serrate landscapes with steep surfaces dominate. Svaneti Caucasus Mountains Southern slope with crystal sub-strata and regional overthrust in the South, which is mainly formed by almost homogenous slate type set, which is easily complaisant to erosive- denudation processes; upper Pleistocene glacier forms and deeply cut mountains/gorges erosive forms, whose macro-morphologic extension is the right slope of river Enguri gorge itself, dominate in the relief's morphology.

337. Upper Svaneti depression's river Enguri gorge is bordered by Svaneti ridge from the South; morphological-structural formation started in the Quaternary and its (divisor ridge of river Enguri and river Tskhenistskali) upside movement has been undergoing since then.

338. Morpho-structuraly Svaneti ridge represents anticlinoria, which has sub-latitude orientation on 90 km. It is divided from the Caucasus ridge at mountain Ailama (4,547 m) surroundings (sources of river Enguri and river Tskhenistkali) an ends on the left side of river Enguri in the West, at village Khaishi surroundings. This, the central, the highest part (3500-4000m) of the morpho-structure is partially formed by Paleozoic age "Disy Set" layers (quarzous sandstones, marbelized limestones, marble) that are stable with regard to denudation processes; clay-slates of Jurassic period that are very sensitive towards erosive processes dominate in the composition of its slopes, however, there are middle Jurassic period so called "porphyrites set" of volcanogenic in its structure at the end, at village Khaishi territory. All these sets are intensely located and they are separated from each other by tectonic overthrusts and faults. The highest, central part of the ridge has rocky-serrate relief and deeply cut troguli gorge is occupied by modern glaciers; there are about 30 glaciers. Old glacier formations are widespread. Old glacier relief in the area where Jurassic slates are widespread is modified by modern erosive forms – deeply cut V type gorges and their narrow water divisor ridges. It is noteworthy that significant part of the river gorges are situated at the Caucasus ridge or close to it (rivers Kasleti, Khelra, Khumpreris Dzveli Dineba, Dasavluri Lailachala, Arshiris Zemo Dineba, Mukhri and etc.), which must be due to tectonic faults and non-homogenous lithology. Tectonic-seismic gravity formations are widespread in this set of slates. Rocky, steep slope relief forms, with narrow and deeply cut erosive gorges and widespread gravity dump materials, are dominant at volcanic set of layers.

339. River Enguri gorge, which is known also as Zemo Svaneti depression, is characterized by sub-latitude direction and morphologically it represents tectonic-erosive cavity.

340. River Enguri, which originates at Namkvani glacier at 2,800 m elevation, experiences 2,550 m fall over 150 km distance to townlet Jvari. Its canal at lower part of Ushguli is at 2,000 m elevation, at the intersection with river Mulkhuri tributary its elevation is 1,200 m, at village Khaishi its elevation is 550 m, and at townlet Jvari its elevation is 250 m. Main tributaries of river Enguri are the following: Odichala (length 15 km), Mulkhura (27 km), Dolra (20 km), Nakra (22 km), Nenskra (46 km), Tkheisha (18km), Larakvava (17km), Magana (24km), Rukhi (21km), Jumi (61km). Apart from the above listed main tributaries about 232 tributaries fall into river Enguri and their total length exceeds 601 km and all of them divide river Enguri slopes with coefficient 0.59km/km^2-ze.

341. River Enguri flows from its origin source to Ushguli community through quite wide Pleistocene glaciers developed at the trogul gorge. Fauna at this section of the river is largely absent. Below Ushguli the river enters woody erosive gorge, which is being squeezed by secondary water divisor ridge legs and this kind of morphology is maintained until Ipari. At this point river Enguri continues flow in typical erosive asymmetrical profile gorge, whose right slope was developed at Ugviri ridge's lower and latitudinal slopes and the left slope is Svaneti ridge's high elevation steep slope. At the river Mulkhuri mouth River Enguri enters wide erosive gorge with quite vast and significant steep erosive terraces. Villages Becho, Etseri, Pari and others are situated on those terraces. Original vegetation is almost extinct at the populated area; vegetation is mainly represented by secondary bushes and small plots of deciduous wood. Significant woods exist only on higher elevation slopes of Caucasus and Svaneti ridges. Such type of vegetation exists in the gorge till village Lakhamuli. River Enguri gorge gradually becomes narrower and deeper below; terraces are gone, slopes are very steep and mainly rocky and such characteristics are maintained till townlet Jvari.

342. River Enguri gorge, which belongs to high mountainous depression type, is characterized by complex morpho-genetic characteristics. It main axis is 130 km long river

Enguri gorge itself, with curvature coefficient 1.42; river Enguri gorge separates from each other Oni and Svaneti ridges, although tectonically both of them belongs to Caucasus mountains Southern slope system's zone. The slopes of river Enguri itself represent extension of lower morphologic levels of Caucasus ridges North and Svaneti ridge's South slopes whose boundary almost coincides with the zone covered by forest.

343. In the area of upper Svaneti depression the gorge of the Enguri River is mainly carved in the slate type set of lower and middle Jurassic age. Metamorphic stratum of Paleozoic layer follows in a narrow strip the area crossing the Svaneti ridge; and at upper Jurassic carbonate flish from East of village Lakhamuri, Mestia, the river crosses a set formed by volcanic layers at Western end of Svaneti ridge, at village Khaishi territory, where cliff type gorge is formed.

344. The morphology of the Enguri River is very much diverse depending on which stratigraphic lithologic layers and morpho-structure it crosses. But it is dominated by erosive, glacial-accumulative and selective-denudation macro and mezzo forms of the surface. In the stratum of Jurassic rock the Enguri river has predominantly carved an asymmetric "V" type gorge with highly elevated and steep sloping left bank, and relatively small right bank the surface of which is significantly modified and complicated by landslide-gravitational steps. The width of the river gorge, starting from 10-20 meters from the bottom, increases gradually and exceeds 1000-1500 meters. Besides, steepness of the river slopes increases in top-down direction within the range of $30\text{-}40^0$ and it is characterized by concave profile. This definitely indicates that in the area of upper Svaneti depression the rate of morpho-structural rise and the dept of erosive intrusion of the Enguri River is much less than that of its neighboring Paleozoic, metamorphic and Jurassic structures consisting of volcanogenic structures. In the same area of the river there must have been large number of sets of river terrains but most of them are masked by slope and flood sediments. But their existence at different altitudes is evidenced by precipitation. The river Enguri, just before river Nakra mouth sharply changes the direction towards South-West and crosses a set of Paleozoic metamorphic complex near Jvari. It maintains such conditions in a set of volcanogenic layers as well. In such layers the Enguri has been carving out its deep and narrow canyon type gorge. In this area in many places the automobile road is carved out of the rocky banks, but at certain places the rocky slopes are so complex the road goes through artificial structures.

345. The slopes of river Enguri are significantly partitioned in the depression boundaries; tributaries are almost symmetric and all of them, excluding river Mulkhura, are oriented towards reversed current directions towards meridian; they flow through trogul gorges and cross modern glaciers. Mulkhuri gorge is especially interesting as the motor road goes on its right side. River Mulkhuri gorge is latitudinal and water flowing from Tviberi and Tsaneri glaciers flow in the river gorge. Geologically upper and middle parts of the gorge are strictly troguli type and the troguli bottom is deeply cute by erosive processes and becomes narrower at lower part, however its bottom is completely filled with glacier-fluvioglacialuri and lake type floorings, which creates inclined pseudo terrain close to river Enguri mouth. River Mestiachala, which originates at Lekhziri and Chalaati glaciers, flows in river Mulkhura at the territory of townlet Mestia, at 1,380 m elevation. This gorge is a typical troguli gorge, which widens at the river mouth; it has pseudo terrain surface and villages Lami, Vanashi and Matskvarishi are located at the terrain.

346. River Dolra's gorge connects to River Enguri at 2,140 m elevation. This gorge is a typical troguli gorge with wide bottom completely filled with glacier and water-glacier floorings. The ridge parallel to the river slope (Bali ridge) is characterized by steps created by old glaciers. River Dolra is deeply carved in glacier and fluvioglacialuri floorings with significantly inclined vast surface.

347. River Neskra's, tributary of river Enguri, gorge, which flows in river Enguri from the right side at village Khaishi territory, represents significant morphological unit. Its length is 40 km and its upper part is formed in crystal layers and lower part in Jurassic slates and volcanogenic layers. This gorge is a typical troguli gorge and its bottom is filled with glacier sediments and its middle part on the territory of village Chuberi is represented by hilly relief formed at the end of upper quaternary age.

3. Surface water

348. Enguri River originates from Namkvani Glacier, at 2800 m above sea level. The riverbed's elevation drops by 2,550 metres along the 150 km section from the river head to town of Jvari. Elevation of the riverbed downstream of Ushguli Comunity is 2,000 m, at the mouth of R. Mulkhura – 1,200 m, at village of Khaisi – 550 m, and at town of Jvari – 250 m. The major tributaries of Enguri River are Odichala (length 15 km), Mulkhura (27 km), Dolra (20 km), Nakra (22 km), Nenskra (46 km), Tkheisha (18 km), Larakvava (17 km), Magana (24 km), Rukhi (21 km), Jumi (61 km). Besides the major tributaries, R. Enguri mouths 232 other minor watercourses with total length exceeding 601 km. All these watercourses compose the drainage density of Enguri watershed (slopes) of 0.59 km/km^2.

349. By chemical composition, the river water belongs to hydrocarbonate class, calcium groups. The water mineralization rate varies from 129.5 to 252.6 mg/l. The highest measured contamination in Enguri River revealed at the cross-section downstream of vil. Abastumani, and is extended downstream along the entire remaining length of the river. Disruptions of the oxygen regime were identified downstream of village of Abastumani with dissolved oxygen rate reduced to 5.25 mg/m and chemical oxygen demand (COD) not exceeding 3.20 mg/l.

350. The maximum concentrations of pollutant substances were as follows: at village of Abastumani Station – ammonia nitrogen – 0.41 mg/l, nitrite nitrogen – 0.040 mg/l, phosphates – 0.090 mg/l; at vil. Darcheli Station – ammonia nitrogen – 0.44 mg/l, nitrite nitrogen – 0.200 mg/l (10 MAC), phosphates – 0.031 mg/l.
The major pollution source was Enguri Pulp and Paper Mill (Ministry of the Forestry and Paper Production of USSR).

351. Enguri River basin comprises the following rivers: Mulkhura, Mestiachala, Magana and Chkhoushi. These rivers' waters belong to hydrocarbonate class, calcium groups. The water mineralization rates changed during year from 76.5 mg/l to 210.3 mg/l. Organic matter content (CAD) did not exceed 3.1 mg/l.

352. The maximum concentrations of contaminating substances were as follows: ammonia nitrogen – 0.45 mg/l, nitrite nitrogen – 0.116 mg/l, phosphates – 0.057 mg/l.

a. Brief Hydrographical Overview of Enguri River

353. Enguri river originates by merging of the two creeks originating from the glaciers of Skhara (5058 m) and Nuamkuani (4278 m) summits, at 2520 m absolute elevation, and mouth into the Black Sea at village of Anaklia.

354. Total river length is 213 m, total elevation drop – 2520 m, average gradient – 11.8%, watershed area – 4060 km2, average altitude of the river catchment basin – 1840 m.

Enguri River mouths 242 tributaries with total length of 872 km. The major tributaries are Odichala (15 km), Mulkhura (27 km), Dolra (20 km), Nakra (22 km), Nenskra (46 km), Tkheisha (18 km), Larakvava (17 km), Magana (24 km), Rukhi (21 km), Jumi (61 km).

355. The watershed has asymmetric shape, with areas of the right and left sides of 2316.9 km^2 and 1743.1 km^2 respectively. The highland area composes 74.5% of the watershed, while remaining 25.5% is expanded over the foothills and plain. The highland watershed zone includes 174 glaciers with total area of 333 km^2.

356. The river is fed by glaciers, snow, rainfall and groundwater. The snow, rainfall and glacier waters provide the considerable contribution to the annual river runoff. The river regime is characterised by floods during the warm seasons and lower fluctuating baseflow levels during the colder periods. The floods caused by snow and glacier melting are often coincided with the rainfall floods. Also, the rainfall floods occur often during the dry periods. From 80% to 82% of the annual runoff occurs in the warmer period with extensive melting of the snow and glaciers, and only 7-8% falls to the cold period.

357. The river is employed for power generation using 271.5 m high arch dam, which creates Enguri Reservoir with total and effective storage capacities of 1,100 million and 680 million cubic metres respectively. From this reservoir water is supplied to the Enguri Hydro Power Plant and further downstream to the cascade of four other hydros (Vardnili Cascade) built in Eristskali River basin with total designed capacity of 1640 MW and average multi-annual output of 5460 million kWh.

358. Enguri River's runoff was studied in various periods using the data of 20 water stations. From these, currently one station is in operation (at village of Khaishi), where only water levels are recorded, but no flow rates are monitored.

359. Flow regime of Enguri River is estimated using the daily water levels and flows measured at Ipari and Khaishi water stations in 1986, which are the most recent officially published data. The tables with water levels/flows provide the average levels/flows (means of the 8 hr and 20 hr records), while the appropriate maximum values recorded at 8 and 20 hours during specific months are given in the 'Max' and 'Min' fields under respective tables.

360. Ipari water station is located at km 180 from the river mouth. Watershed area corresponding to this station is 362 km^2. The average annual water level based on 1986 data at Ipari station was 139 cm. The maximum level of 237 cm was recorded on 26 July, and the minimum level of 112 cm on 1 February. In 1986, the average, maximum and minimum flow rates in the same section were 11.8 m^3/s, 93.0 m^3/s and 4.24 m^3/s respectively.

361. Khaishi water station is located at km 114 from the river mouth. Watershed area corresponding to this station is 2780 km^2. The average annual water level based on 1986 data at Ipari station was 184 cm. The maximum level of 349 cm (absolute altitude 530.92 m) was recorded on 7 July, and the minimum level of 100 cm (absolute altitude 530.08 m) on 18 December. In 1986, the average, maximum and minimum flow rates in the same section were 123 m^3/s, 555 m^3/s and 21.0 m^3/s respectively.

b. Maximum Flows of the Rivers Crossing the Rehabilitated Khaishi-Mestia Road

362. In accordance with 1:25,000 topographic map, the rehabilitated Khaishi-Mestia motor road is crossed by 16 watercourses, including 5 rivers, 6 creeks and 4 dry gorges. Based on analysis of the data collected during 54 year long intercepted observations, the absolute maximum flow rate recorded in 1948 did not exceed 99.5 m^3/s. It means that the actual maximum flows could occur in the interim periods between the observations and thus should be missed from the records. Due to such reason, processing of the measurement records for determining the rated flows was not considered as reasonable.

363. Therefore, the maximum flow rates in the rivers crossing the Khaishi-Mestia rehabilitated road alignment have been determined using the method recommended by Technical Guidance for Calculation of the Maximum River Flows in Caucasus Conditions for estimation of the maximum flows in rivers with catchment basins smaller than 400 km^2, and Hydrology Handbook – Surface Water Resources of USSR, vol. IX, edition I.

364. The values of morphometric elements required for calculation of the maximum flows in the rivers crossing the rehabilitated motor road determined based on the 1:25,000 scale topographic map are given in Table 8.

Table 8 Morphometry elements of the rivers crossing the rehabilitated motor road

River	F Km^2	L L	i_{Kal}	i_a %	Σl_{Km}	ξ	φ	K	δ
Kazax-tvibi	14.7	5.80	0.276	62.0	5.60	0.27	0.26	6	1
luxra	15.6	8.20	0.221	54.4	4.20	0.27	0.34	6	1
Nakra	169	22.7	0.102	63.1	33.0	0.27	0.34	6	1
ManSura	22.7	8.40	0.244	52.6	6.80	0.27	0.34	6	1
Ladlina	16.3	8.30	0.263	52.2	5.60	0.27	0.34	6	1
Kini	14.3	7.30	0.253	48.2	3.00	0.27	0.34	6	1
LeSta	9.00	7.10	0.220	42.3	2.00	0.27	0.34	6	1
Soledra	5.70	4.96	0.192	48.0	2.40	0.27	0.34	6	1
Dolra	182	19.8	0.082	59.8	14.2	0.27	0.34	6	1
LaSkudiaSara	12.1	7.50	0.189	41.1	4.60	0.27	0.34	6	1
PuSkueri	16.0	7.20	0.258	59.6	4.40	0.27	0.34	6	1

365. All necessary parameters determined based on the specific morphometry elements, as well as the maximum water flow rates are given in Table 9 below.

Table 9 Maximum discharge rates of the rivers crossing the rehabilitated motor road

Riwer	P%	τ year	T m	H mm	i mm/m	α	β	v m/sek .	v m/se .color	Q m^3/sek	Q m^3/sek Calc.
Kazax-tvibi	1	100	72.7	78.6	1.08	0.54	0.738	2.17	0.38	105	105
	2	50	81.2	67.5	0.83	0.51	0.764	2.05	0.32	79.3	79.5
	10	10	104	47.0	0.45	0.44	0.815	1.78	0.22	39.6	40.0
Luxra	1	100	100	86.9	0.87	0.53	0.767	2.09	0.32	91.9	92.0
	2	50	109	74.0	0.68	0.50	0.788	1.98	0.28	69.7	70.0
	10	10	133	50.8	0.38	0.44	0.832	1.74	0.19	36.2	36.5
Nakra	1	100	209	109	0.52	0.51	0.555	2.77	0.39	415	415
	2	50	218	91.7	0.42	0.48	0.581	2.64	0.34	330	330

	10	10	260	62.6	0.24	0.43	0.654	2.37	0.25	190	190
ManSura	1	100	100	86.9	0.87	0.53	0.726	2.24	0.34	127	127
	2	50	109	74.0	0.68	0.50	0.750	2.12	0.30	96.5	97.0
	10	10	135	51.1	0.38	0.44	0.801	1.86	0.21	50.7	51.0
Ladlina	1	100	95.9	85.7	0.89	0.53	0.759	2.13	0.31	97.3	97.5
	2	50	107	73.6	0.69	0.50	0.782	2.01	0.26	73.3	73.5
	10	10	131	50.5	0.38	0.44	0.826	1.76	0.18	38.0	38.0
Kini	1	100	92.5	84.7	0.92	0.53	0.768	2.09	0.33	88.8	89.0
	2	50	104	72.9	0.70	0.50	0.792	1.97	0.28	66.1	66.5
	10	10	129	50.4	0.39	0.44	0.835	1.72	0.20	34.2	34.5
LeSta	1	100	95.8	85.7	0.89	0.54	0.814	1.91	0.27	59.0	59.0
	2	50	103	72.8	0.71	0.50	0.830	1.80	0.23	44.0	44.0
	10	10	127	50.0	0.39	0.44	0.866	1.58	0.16	22.5	22.5
Soledra	1	100	71.1	78.1	1.10	0.55	0.825	1.83	0.28	47.4	47.5
	2	50	75.0	65.9	0.88	0.51	0.839	1.73	0.24	35.8	36.0
	10	10	93.0	45.5	0.49	0.45	0.873	1.51	0.17	18.3	18.5
Dolra	1	100	212	110	0.52	0.51	0.545	2.76	0.52	439	440
	2	50	229	93.2	0.41	0.48	0.577	2.63	0.44	345	345
	10	10	287	64.5	0.22	0.43	0.657	2.34	0.31	193	195
LaSkudiaSara	1	100	95.2	85.8	0.90	0.54	0.785	2.01	0.27	77.0	77.0
	2	50	104	72.9	0.70	0.50	0.805	1.89	0.23	56.8	57.0
	10	10	131	50.6	0.39	0.44	0.846	1.66	0.16	29.3	29.5
PuSkueri	1	100	91.4	84.4	0.92	0.54	0.755	2.14	0.36	100	100
	2	50	97.8	71.5	0.73	0.50	0.775	2.02	0.31	75.4	75.5
	10	10	126	50.0	0.40	0.44	0.824	1.77	0.21	38.7	39.0

4. Groundwater

366. The water-bearing formation built by contemporary alluvial deposits is characterized by free groundwater table declined along the general flow of the rivers. The water table depths vary from 0.5 m to 5.0 m. At some locations nearby riverbeds and groves, groundwater depths are reduced to 0.3 m. The aquifer is characterized by rich water resources, with debits of the springs varying in the range of 0.1-3.5 l/s. The aquifer is mainly fed from river and precipitation waters. Despite the aquifer is rich with water, its practical water use is limited due to restricted distribution of the alluvial deposits. In addition, it shall be stated that impact on this aquifer should be minimal due to limited work quantities to be performed within the grove.

5. Geology/Seismology

367. The gorge of River Enguri within the Zemo Svaneti depression area tectonically belongs to the areas of Mestia-Tianeti and Chkhalta-Laili shelled folded zones of the Caucasus folded system, the boundaries between which are separated by the tectonic overthsursts and faults characteristic for the region. These tectonic areas are built of Lower-Mid Jurassic Period slates, with the Upper Jurassic and Lower Cretaceous Period carbonate flysch and Mid Jurassic volcanogenic sedimentary rocks. All these rocks are tectonically intensively dislocated and have produced many significant folded structures. Among them Mestia-Shovi synclines, Khibiani, Lukhumi, Kheshuri, Dabieri-Tviberi, Dizi-Ushuri, Lablakhi-Tchviberi, Khaisi anticlines, etc are to be highlighted.

368. Within the study territory so called ‘Dizi Series’ of the earliest Paleozoic age which form the tallest elevated largest two anticline folds of coulisses disposition towards the general Caucasus direction. The folds are stretched sub-meridianly from the West to the East at 60-65 km on the right bank of Riv. Nenskra and in the areas of Virari continuing to the East on the Svaneti Ridge up to the Lasili Ridge.

369. Lithologically, 'Dizi Series' are represented as green corrugated filets, light grey sandstones, pyro-clastoliths of andezite-dacite content, marble streaks, flint slates and silicite interlayers, dark grey gravilites and silicite interlayers, and streaks of internal formation conglomerates.

370. 'Dizi Series' developing rocks with their engineering-geological properties, as a whole, belong to the hard rocks of high metamorphic strength and are dislocated so intensively that they extend to the secondary fine folds. All the developing rocks of 'Dizi Series', in the sound condition, notwithstanding their intensive folding and fracturing, are characterized by the high strength and stability. (6) The volumetric mass or these rocks fluctuate between 2.6-2.8 gr/cm^3, the porosity is 0.40-1.5%, the water absorbency is 0.1-0.5%. The strength of the rocks in the natural condition - from 30.6-36 MPa (from 30-135 MPa the metamorphic slates, marble) – to 215-219 MPa (metamorphic sandstones). The strength of these rocks after the water absorbance drops from 26-33-95 MPa (marble, clay-shales) to 125-130 MPa (sandstones). Their strength consequently drops to 20-65 MPa from 120 MPa after 15 freezing cycles.

371. The 'Dizi Series' complex, notwithstanding the fact that it is characterized with high strength and stability, under the circumstances of severe climate of high mountainous places, in the area of contacting with the atmosphere it experiences intensive mechanical- freezing weathering, especially in the area of high fracturing. However, the 'Dizi Series' still maintain a significant strength. The strength of the weathering crust fluctuates from 2-4 m to 18-20m and mainly the weathering areas of coarse block talus and broken rocks are prevalent. Since these rocks are dominated by the relief forms of nivation glacier and erosive character with strongly inclined surfaces (more than 30-60^0), the intensive gravitational processes of permanent renewal are underway in almost all the exposed areas of the rock surfaces and strong coluvial material is being accumulated at the foot of the exposed slopes and in the area of the motorway (Figures 11,12).

Figure 11. Material acumulated at the foot of the exposed slopes

Figure 12. Material acumulated at the foot of the exposed slopes

372. The Lower and Mid Jurassic Period slate type sets of sediments dominate the study territory. These sediments continuously build the South slope of the Svaneti Caucasioni, to the South of the Regional overthrust and both wings of Svaneti anticlinorium ridge.

373. The Lower Jurassic Period sediments start with the plizebach floor which is represented by the aspide slates and clay-shales, by the interlayers of siltstones and sandstones and internal formation conglomerates streaks which are transgressively located on the substratum of the crystal rocks.

374. On these series of Lower Dizi the black clay-shales, aleuroliths of Mid Lias toarse floor are transgressively located and rarely there are internal formation conglomerates streaks and interlayers, and there are some thick-layer and massive limestone thick packs.
The Lower Lias slate type set is consequently followed by the Mid Jurassic Period flysch which is also represented by clay-shales, sandstones and conglomerate layers in the Mestia and Tianeti area.

375. Unsegmented sediments of Mid Jurassic Period, that is clay and clay-shales, argillites, sandstones and siltstones build the North edge of Enguri depression at the Mestia-Tsna section. Lower and Mid Jurassic age slate type sets with their engineering-geological properties are combined in the single terrigenous- metamorphic formation complex, which is represented by the aspide slates, clay-shales, siltstones, thin and thick-layer sandstones, the interlayers of conglomerates and streaks rarely dominated with slate rocks. The whole sets are intensively dislocated up to the narrow, frequently isoclinic folds, with strong tectonic faults and are disrupted in blocks the fractures of which are frequently filled in with quartz and calcite lodes.

376. The slate type complex mainly belongs to the group of semi-hard rock and low strength hard rocks. In this respect the aspide clay-shales whose physical and mechanical properties fluctuate within the following parameters: the volumetric mass is 2.55-2.60gr/cm^3, and it is 137-138 MPa in the upper part of the log of natural environment. In the water saturated environment it is 49 MPa; after freezing it is 82-87 MPa. In the weathered environment to some extent the strength of these rocks significantly decreases: the density is 2.45-2.55 gr/cm^3, the strength in the natural environment is 105-115, and in the water saturated environment it is 40-68, while in the freezing regime it is 63-64 MPa.

377. The sandstones occupy a limited position in the set and are represented by the Carsian - Arkosic, Arkosic - Quartz consisting of the polymictic composition; it is mostly fine-grained, and mostly with the contact cementation, and rarely with the contact-porous; the density of clay-lime sandstones in the natural environment 2.70 gr/cm^3, in the averagely weathered condition it is 2.60 gr/cm^3; its density consequently changes and drops from 205 MPa to 95 MPa, and in the water saturated condition it drops from 169 to 76 MPa, and after freezing – from 134 MPa to 61 MPa. Notwithstanding a significant decrease in the strength of the sandstones in the weathering area, the rocks still maintain stability and in the form of interlayers they are presented as rock extensions in the slate sets.

378. Overall, the slate type sets easily subject to exogenous agents and in the weathering area their natural bearing capacities decline by 4-5-times, especially in the tectonically fragmented areas, whose capacity is measured in tens of meters. Not only their granular content changes in the weathering area, where the fine grained (2-10mm) thin-layer slate detritus dominates in the slate type set (up to 70-85%), - but also the geo-chemical content changes with the silicates exceeding 10%, sodium dioxide increases 2 times and the potassium dioxide increases 2 times.

379. In the area of the slate type sets there is a significantly favorable environment created for the development of landslide and especially mudflow processes.

380. Mid Jurassic Period volcanogenic rocks surround the depression of the gorge from the South-West and develop the anticline structure of Khaishi. Lithologically, they are represented by the calc-alkali basalts, Andesibazalt, Andesite and Dacite lavas, with breccias and pyro-clastoliths, tuffites, with some tuffo turbidites, tuffoargillites, while in the upper log there are tuffo-conglomerates, tuffo sandstones, tuffo-alevrolites and clay-shales. The porfirite set dominates in the lower part of the log.

381. By its engineering-geological properties the volcanogenic set belongs to the high strength and stability group, where its density is within the range of 2.57-2.82gr/cm3, and the strength does not drop below102-210 MPa even in the water saturated environment, and even in the weathered condition it maintains the high figures within the range of 88-128 MPa. Tuffs and sandstones on the clay cement are the exception to this and their strength in the natural environment ranges within 68-81 MPa, and drops to 57-72 MPa in the water saturated environment. Though, their place is limited within 1-5% in the geological log.
According to the geophysical surveys the strength of weathering crust of volcanic set does not exceed 15-20m and as a whole is represented by the block talus and fractured area. In the relief it maintains the profile of rock morphology and everywhere creates the background of active gravitation.

382. They flysch deposits of Lower Cretaceous terrigenous-carbonate form the sinclinic structure of tectonic unit, which is sub-meridian oriented and almost to the direction of the

Caucasioni. Lithologically, it is represented by the interchange of clastic limestones and sandstone turbidites, pelagic marls, limestones, argivites and clay-shales. As a whole, the layers of this stratum are intensively dislocated and extended to the fine folds and blocks.

383. The engineering-geological properties of the rocks consisting of these layers differ significantly from each other in terms of stability and strength and belong to the group of low strength hard rocks and semi-hard rocks.

384. Marl limestones are characterized with relatively high strength whose density is within the range of 2.6gr/cm^3 , while the strength under the natural conditions is 96-120 MPa and drops to 73-90 MPa under the water conditions, and in case of freezing it amounts to 57 MPa. The softening coefficient of limes is 0.75. The strength of limestones, under the relatively weathered environment, drops to 60-54 MPa.

385. The marls and carbonate clay-shales belong to the group of semi-hard rocks whose stability and strength quickly drop in the process of contacting the atmosphere. The density of these rocks vary within 2.4-2.6 (clay-shales); 88-2,42gr/cm^3 (marls), Consequently, their strength in the natural conditions and in the water conditions change: for clay-shales the strength changes from 98-72 MPa to 62-51 MPa; for marls the strength changes from 32-34 MPa to 28-29 MPa.

386. These layers of stratum are distinguished with the selective dependency to the weathering process and the weathering products are distinguished with a different geometry and granular content. Marl limestones are relatively stable and produce coarse broken products, where those beyond 50-200 mm account for 45-60% of the total content.

387. In the rocks of marl and clay-shales a strong weathering area of detritus and broken rock is developed which produces thin-layer slates.

388. The above described main rocks under the conditions of relevant relief and with the surface inclination less than 45^0, are covered from above with the Quaternary slope, alluvion and glacier deposits.

389. Slope deposits are particularly common whose lithological and fractional content and thickness depend on the petrography of main rocks, and on their strength and resistance to the weathering and denudation processes.

390. Usually, a coarse detritus colivial formations are produced in the area of usual ‘Dizi Series’ metamorphic and Bajocian volcanogenic complex, as well as in the Lower Cretaceous Age carbonate rocks, at the foot of slopes. Their thinness mostly fluctuates within the first 10 m. The Cretaceous land slide material is characterized by a completely different geometry and is dominated by the block talus material, where the fractions above 100 mm account for 33-55%; the fractions less than 2 mm amounts to 2.5-7% in the ‘Dizi Series’; 4,5-11% - in the volcanogenic rocks; and 8-18% - in the Cretaceous carbonate flysch.

391. Of the slope complex, in respect of the extent of spread of lithological-facies content and the landslide and mudflow developments therein, the Eluvial and Deluvial deposits draw a special attention. These kinds of deposits are distinguished by its thickness, and low engineering-geological characters. They are products produced on the slate and marl rocks of Lower and Mid Jurassic Period slate type sets of sediments and Cretaceous carbonate flysch. Their thickness is particularly significant in the areas of tectonic fault of slate type layers of

rocks. Under the conditions of significant inclination the weathered material of these rocks create cone character loop shapes of thin-layer easily movable taluses and in the areas where they are being deeply disintegrated and the dispersive material is subject to torrential surface washes, strong formations of clay deposits are being formed on the low inclination relief which represent a key factor in provoking landslide process. As usually, given these types of genesis formation, and because of the lithological content of bed-rocks, the content of clay facies ranges within 30-38% and the detritus ranges within 25-40%. The clay facies is of clay and clay-like composition whose physical and mechanical properties are as follows: volumetric mass is 1,6-2,0gr/cm^3, the porosity is 20-43%, the natural humidity is 25.5% (the formations developed on the clay-slate layers of stratum are especially distinguished with their high humidity); Ten plasticity numbers range within 18-24 and the saturation number range within 0.8-6.0%. The displacement resistance is as follows: the cohesion - 0,450-1,250f.kg/cm^2, the angle of internal friction is 7-32^0, the porosity coefficient is 5kg/cm^2-0.510-0.700, and the settlement coefficient is 2.75-95. It is noteworthy, that the characteristics of displacement resistance of clay deposits and deformation significantly decreases and respectively the angle of internal friction ranges within 5-24^0 and the cohesion is 0,100-0,300f.kg/cm^2.

392. The pluvial mantles on the study territory are presented by the alluvial–fluvioglacial and proluvial genesis.

393. Alluvial–fluvioglacial mantles construct the riverbeds of river gullies and low terraces which are facially represented by shingle and boulders, coarse-grained sands and rarely - by the sandy-loam. According to the geophysical characters their thickness is within the range of 2-25 m. The granular content of alluvial deposits examined in the river gorges shows that the fractions higher than 2000 mm (25-41%) dominate everywhere in the area and those less than 2mm are within 2-5% range. An exception to this is the content of II terrace where this fraction (that is less than 2 mm) increases up to 9.5%.

394. Proluvial mantles, the majority of which is of mudflow genesis, mainly structure the detrital cone of Riv. Enguri tributaries. The lithological-fractional content of proluvial mantles and their thickness depends on the petrographic content of the bed-rocks, their stability and the energy of the Rivers. According to the geophysical surveys the thickness of these deposits ranges from 2-5 to 30-50 m. These deposits mainly are the mix of mud-and-stone flows and block talus - broken rock - clay facies mass. Since the proluvial mantles are of mudflow genesis, the formation of these deposits and sedimentation in the area of detrital cones periodically takes place and we encounter not only renewable mantles, but also the old mantels on the high terrace like surfaces cut by the Rivers. Besides, their granulometric-facies content is somehow different. Though the coarse block talus and broken rock material is dominant in the proluvial mantles, their existing fine grained material significantly increases in the structure of the old detrital cones. For instance, if the fraction which is less than 2 mm, ranges within 5-10% in the current mantles, in the structure of old detrital cones it increases to 15-30%.

395. The Pleistocene glacier deposits are quite significantly spread in the study territory. All large tributaries of the Riv. Enguri (such as, Mestiatchala, Mulkhura, Nenskra, Nakra, Dolra, etc), and the upper line of the gorges are structured with these deposits. Almost all the settlement areas existing at the Riv. Enguri tributaries are located on the upper morainal sediments. The same type of glacial sediments are widely maintained on the slopes of the Riv. Enguri gorge itself at 50-500 m relative height from the current riverbed where several stages of pleistocenic freezing stages are clearly observable (7). Glacial deposits and their morphological forms are described for the villages of Nakri, Lamshori, Ushkhvanari, Murkmeli, Becho, Etseri and other villages and the town of Mestia territories. Glacial deposits in all of these territories

are presented by coarse block talus and broken rocks, and by the mixed and unsorted clay and clay-like facies. In the glacial deposits the fractions above 100 mm ranges from 27-35% to 55-60%, and the fractions less than 2 mm range from 2.5-5 to 15-19%. Such a big difference in terms of fractions of the glacial deposits is directly dependent on the petrographic content of the bed-rocks and their stability characters. In the crystal slates and morainal mantles contained in the 'Dizi Series' the percentage of fine fractions is less compared with those created in the Jurassic and Cretaceous age slate and flysch layers of stratum.

396. A complex geological structure of Zemo Svaneti and its climatic and relief conditions precondition large scale development of dangerous geological processes in the regions and frequent occurrences of these processes at certain time. Below we include a short description of dangerous geological processes that pose risks for the motor road.

397. The biggest danger is created by mudflow processes, landslides and avalanches. Similarly dangerous are earthquakes and landslide and gravitational events provoked by them. The maximum magnitude of earthquakes is 9 points. It is noteworthy, that in the above mentioned areas the earthquakes of 6-9 points' magnitude have been observed 20 times after 1930. These earthquakes were accompanied with the significant activation of landslide and gravitational processes.

398. Zugdidi-Mestia Motor Road runs all along the Riv. Enguri gorge. In respect of geodynamics, this section of Khaisi-Mestia is the most difficult section. This section is structured of the strongly dislocated and presented by tectonically intensively faulty and fragmented areas of Jurassic period layers of clay slates. For this section of the road Annex 4 includes the maps showing the areas where the landslide and gravitational processes can spread.

6. Danger of Mudflow and Avalanches

399. In the area where the Jurassic period clay slates are spread the mudflow processes develop almost in every secondary tribute and gorge. The mudflow forming areas fluctuate within 0.1-0.5 km^2 ; mudflows of Riv. Enguri belong to the high active and risk zone.

400. The threat of avalanches is high on the existing sections of the road: km 90; km 95; km 135; km 138. On the100-120km highway the avalanche threat is relatively low. The danger is increases at the sections of the alternative route (km 0; km 3.5; km 6.5 of Tskhumari; and km 9)

7. Landslides

401. A normal functioning of the motor road is particularly hampered by the wide spread of landslide and gravitational processes. Surface landslides mainly emerge on the slope mantles and in the areas of active weathering and do not pose a significant threat to the motor roads.

402. The relief is wavy and hilly with the stepped stable landslide processes being in dynamics. The slope is covered with the shallow forest and bushes with the slope surface inclination ranging within $15\text{-}50^0$. 3 landslide steps with the total surface inclination of $15\text{-}20^0$ and the inverted topography in the landslide steps, covered with grass and bushes, are observed.

403. The total spread area of landslide relief along the slope exceeds 300 m and the landslide body in the dynamics is within 170 m. The geometry of the landslide body is of circular character. The landslide body existing above the road is of blocking and creeping character

whose central part transforms into the creeping and plastic dynamics and it covers both the subgrade of the road and its lower small section as well.

404. The landslide area of 'Malaia Tvibra' is located on the right slope of Riv. Enguri, on the territory of Village of Pari, at km 114 of the motor road. The slope of Riv. Enguri on this area is characterized with fractured profile. Above the road the relief is presented with the linear morphological hillock the surface of which is modified by the pleistocenic freezing, An average inclination of the slope is 25-350 and is covered with the shallow forest and weakly dissectioned by the gorges (see photo 10). In this area of the slope morphologically there are three landslide steps out of which two landslide steps are currently in the stable condition and the lower one, which immediately adjusts to the motor road , is in the active dynamics and is characterized with the frontal morphology and spreads along the gradient of the road subgrade.

405. The spread length of the landslide body along the surface in the second half 1980s amounted to 150 m, and by 2008 it increased up to 700 m out of which the landslide body which is in the significantly active dynamics spreads up to 200 m, in where the processes engaged the road subgrade and the lower part of the slope, where the packages of faulted layers of broken rock-clay-slates in the landslide body are displaced. Within the boundaries of the landslide body the layers of stratum of clay slates is so deeply faulted and disintegrated tectonically that the bed-rocks are mixed and turn into the black clay facies. The gorge existing in the North-West part of the landslide body which actually gives a landslide contour is developed in the immediate area of tectonic faults. Springs of various flow rates emerge in many places of the landslide body in the active dynamics.

406. The landslide at Vill. Becho is to be highlighted out of the landslides developed in the slope deposits, periodic activations of which hamper the movement on the motor road to some extent.

407. There are two such landslide bodies on the right slope of the Riv, Enguri gorge, in the territory of Vill. Becho (km 120). One of the landslide bodies is to the South-West at 4.5 km from the village and the other is at 2 km to the West. Both of the landslide bodies are developed in the slope deposits of the Lias clay slates. The area of one of the landslide bodies is 7.8 ha and that of the other is 1.5 ha. The deformation depths of the landside bodies respectively amount to 5 m and 2 m. A dynamic activity of these types of landslides is directly related to the increase of humidity in the soils due to the precipitation and they have the fluidity nature with the activation periods mostly coming on early spring and Fall. Every activation of landslides threaten the normal functioning of the motor road.

B. Ecological Resources

1. Forests

408. From its source Riv. Enguri flows to the Ushguli community via the quite wide gorge, which was developed as a result of pleistocenic freezing. In this section of the gorge there is almost no trees and vegetation.

409. From the mouth of Riv. Mulkhuri, Riv. Enguri enters a wide, erosive gorge though quite big and significantly inclined erosive terraces. Vill. Becho, Etseri, Pari and others are located on these terraces. The primary vegetation in the settlement area is no longer observed and is mainly represented by the secondary bushes and of deciduous plants on small areas. Signficant forests are observed only on the high slopes of the Caucasusioni and the Svaneti Ridges.

410. Thus, based on the review of the literature and the field surveys the following sensitive areas has been found in the corridor of planned Khaisi-Mestia motor road. They are mainly the forests along the road and immediately adjusting to it:

(i) A small section at 100 km (Riv. Manshura Gorge);
(ii) A small section at km 104 (Riv. Ladlina Gorge);
(iii) The territory between 120-126 km to the left of the road (from Village Dolasvip up to Village Martskhvarishi).

Table 10 Species from the Red List of Georgia in the areas of the planned motor road of Khaishi-Mestia Corridor

	Latin	Category of the protected area
1	*Castanea sativa* Mill.	VU
2	*Quercus macranthera* Fisch. et Mey.	VU

411. It needs to be noted that the red list species of Georgia consisting of 56 species is not a complete list. At now the list is being modified. Specifically, the grass plants are being identified according to the IUCN categories (the categories showing their conditions and vulnerability statuses are being identified). By using these data the actual number of the species on the red list of Georgia will be significantly increased).

412. After having conducted field botanical surveys (the pre construction field visits) the list will be probably increased.

2. Protected Area

413. In Georgia the history of Protected Areas dates back many centuries. The first Protected Area – Lagodekhi Strict Nature Reserve was established as early as 1912. At present the total area of Protected Areas is 495 892 hectares, which is about 7 % of the country's territory. About 75 % of Protected Areas are covered by forests. There are 14 Strict Nature Reserves, 8 National Parks, 12 Managed Nature Reserves, 14 Natural Monuments and 2 Protected Landscapes in Georgia. Primary function of the Protected Areas is protection of natural heritage of the country.

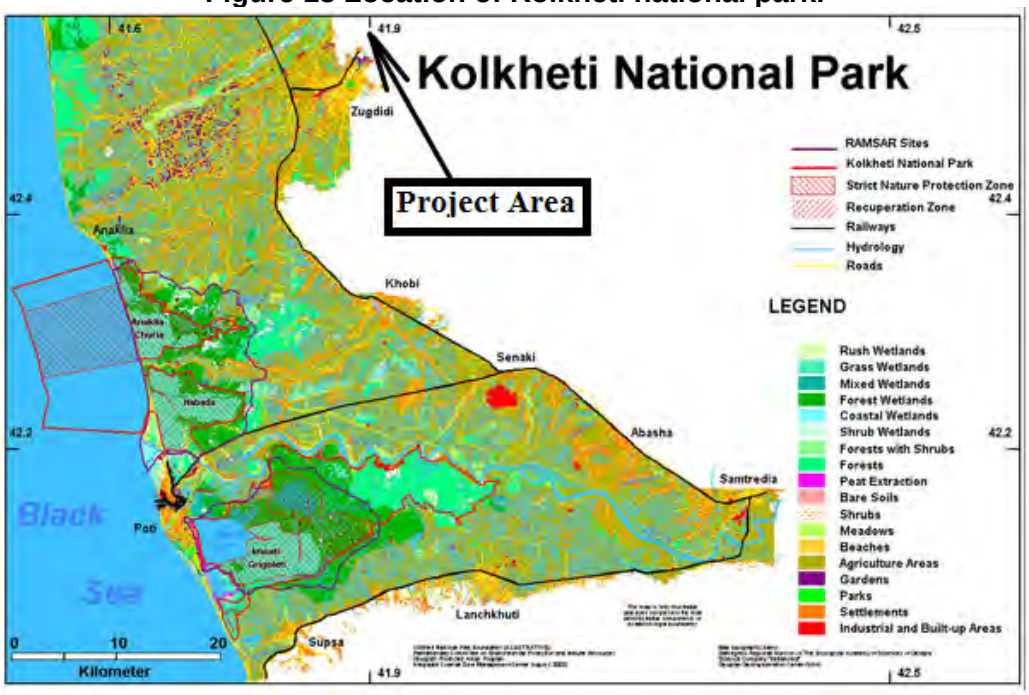
Table 11 Date of protected areas of Georgia

Protected Area	Management type	Size in hectares	Marine area	IUCN Category	Latitude	Longitude
Ajameti	Nature Reserve	4,845		IV	-14.519105	22.573145
Akhmeta	Nature Reserve	16,297			-12.260223	30.86119
Algety	Nature Reserve	6,822		III	-17.875123	25.81281
Bichvinta-Miusera	Nature Reserve	3,645			-8.659493	29.44296
Borjomi	Nature Reserve	17,948			-11.125663	30.57781
Kazbegi	Nature Reserve	8,707			-12.517351	32.23696

Protected Area	Management type	Size in hectares	Marine area	IUCN Category	Latitude	Longitude
Kintrishi	Nature Reserve	13,893		IV	-12.582472	30.21586
Kolkheti	Nature Reserve	500		IV	-12.7526	32.58976
Lagodekhi	Nature Reserve	17,932		IV	-16.397579	25.984675
Liakhvi	Nature Reserve	6,388		IV	-10.6	33.61
Mariamjvari	Nature Reserve	1,040		IV	-12.16	24.83
Pskhu-Gumista	Nature Reserve	40,819		IV	-15.98	27.25
Ritsa	Nature Reserve	16,288		IV	-12.98	27.85
Saguramo	Nature Reserve	5,359		III	-9.86	28.95
Sataplia	Nature Reserve	354			-10.11	30.58
Vashlovani	Nature Reserve	8,034		III	-8.6	31.25

414. The nearest protected area from project area is Kolxeti National park (Distance from construction area 200 km), which is located in West Georgia, in the Kolkheti coastal plain lying between the mouths of the Tikori and Supsa. The Kolkheti National Park covers an area of 28 940 ha of land, spread over the administrative districts of Zugdidi, Khobi, Lanchkhuti, Senaki and Abasha and includes 15 742 ha of marine territory. The park was established in 1999 as part of Georgia's Integrated Coastal Management Project with the financial support of the World Bank (WB) and the Global Environmental Fund (GEF). The National Park includes the Kolkheti State Nature Reserve established in 1947 (500ha) and the adjacent wetlands, including the Paleastomi Lake.

Figure 13 Location of Kolkheti national park.



3. Relief and Geology

415. The surface of the land is almost ideally flat, slightly eroded by swamp rivers of small depths. A narrow dune ridge, some 100-200-meters-wide has developed along the Black sea shore that rises some 2-3m above the coastal plain. The elevation of the land within the park ranges between 0-10m. Down to the depth of 10-15m it is formed by sediments of river, swamp, lake and coastal-sea origin, such as clays, sands, silt and peat, deposited during the last 4-6 thousand years.

4. Hydrology

416. The park is cut by a numerous bog-type small stagnant rivers (Pichori, Kukani, Dedabera, Tkhorina, Tsia, Tsiva, Churia, Munchia, Mukhurjina, etc.). Here one can find the scenic lakes – Paleastomi, Patara Paleastomi, Imnati, Parto Tskali. The peat bogs such as Anaklia, Churia, Nabada, Imnati, Maltakva, Grigoleti and Pichori that contain contemporary and fossil unbroken peat layers are located in the coastal plain. The thickness of the peat layers in certain places exceeds 12 meters. The main mass of peat in the mentioned bogs are subsided below the sea level.

5. Vegetative Cover

417. The warm, humid climate and the dense hydrographical network have, to a great extent, contributed to the rich floristical composition and the development of rather diverse vegetation. The coastal peat bogs are the home for the Boreal flora species - sphagnum mosses – *Sphagnum spp*.; *Drozera roxundiflora, Drosera rotundifolia, Rhinchospora afla, Carex lasiocarpa, Menianthes trifoliata,* etc. The plants of the alpine zone – *Rhododendron flavum* and *Rhododendron ponticum* give the bogs especial appearance. In the swamped and wetland forests, alongside the peat bogs, *Alnus barbata, Pterocarya pterocarpa, Quercus imeretina, Quercus hartwissiana,* etc., are found. These forests are characterised by the development of evergreen undergrowth (*Hedera colchica*, etc.). Aquatic plants, such as *Nymphaea alba, Trapa,* etc., are common in the peat bogs, lakes, swamp rivers and along them. The vegetation of coastal zone's sandy dunes is of much interest. On the substrata of this narrow stripe typical salt-loving, xerophytes and ephemeral vegetation (*Hippophae rhamnoides, Paliurus spina-christi, Imperata cylindrical, Cynodon dactylon, Pancratium maritimum, Glaucum corniculatum*, etc.) are developed. The uniqueness of the park's vegetation is determined by plentiness of relic and endemic species (*Alnus barbata, Pterocarya pterocarpa, Quercus imeretina, Quercus hartwissiana, Trapa*, etc.).

6. Fauna

418. The coastal zone of the park together with the adjacent marine area lies along one of the main routes of migration of water- fowls and waders of Africa and Eurasia. Over 194 different bird species are found within the region, including 21 species of migratory birds. A number of species, such as Black Stork (*Ciconia Nigra*), Crane (*Grus grus*), Great White Egret (*Egretta alba*), are on the verge of extinction and included in the Red Data Book of Georgia. The National Park together with other areas of the Kolkheti lowlands is considered to be the homeland of the legendary Kolkhuri pheasant. The park swamps, swamp rivers, lakes, swamped and wetland forests provide a shelter for a number of endangered species, such as roe deer, boar, otter, Triturus vittatus, Emys orbicularis, Elaphe longisima. The marine area provides a comparatively undisturbed habitat for dolphins (*Delphinus delphis, Tursiops truncates, Phocoena phocoena*).

C. Rare or Endangered Species

419. The highway corridor to be reconstructed is located in two main landscapes: there are deciduous and mixed forests and the secondary meadows surrounding the settlements and which are used as pastures and cornfields. A main landscape in the road reconstruction corridor is represented by the forest. In the hardly accessible areas the forest is well preserved and in the easily accessible areas it is quite degraded by the human impact (cutting) on it. The road from Khaisi to Mestia is located in the Enguri Gorge and runs along Riv. Enguri. The highway crosses or passes in the immediate vicinity of many large or small rivers and brooks, among which Riv. Enguri, Khaishura, nenskra, Nakra, Khumproeri, Dolra, Mulkhura and Mestiatchala need to be highlighted.

420. According to the zoo-geographical division the South Caucasus belong to the Sub-County of East Meditation Sea of Paleractic County. The highway crosses the Caucasus part of this Sub-County (Vereshagin, 1958; Gazhdiev 1986).
The species included in the red list of Georgia (here we include the species which dwell or may present in the corridor impacted by the Khaisi-Mestia highway).

421. The land area of Kolkheti Park consist of 28571 ha, the sea area is 1574 ha. The Paliastomi Lake located in the territory of the Park is be highlighted. Its total area is 18.2 sq.m., and the maximum depth reaches 3.2 meters. The Paliastomi Lake is rich with fishes, especially with pike perch and grey mullet. The Paliastomi Lake can be considered as one of the significant reservoirs for pike perch. Overall there are 88 known fishes in the territory of the Kolkheti National Park among which 44 dwell in the Black Sea, 21 dwell in the fresh waters and 23 fishes travel from one place to another. Out of other fishes in the Black Sea salmons, herrings, Atlantic sturgeons need to be highlighted. The Paliastomi Lake along with the Black Sea water area are one of the significant regions for migration of birds from Africa and Eurasia and swamp birds. There are 194 species of birds that nest and winter in the moist forests, swamps and rivers, out of which 76 species are migratory, 62 are inhabitants, and 56 are winter species. Out of the winter specifies the goose, white- fronted goose, wild goose, whooper swan, Dalmatian pelican, black stork, small white heron, and white tailed eagle.

Table 12 The species which are observed in the areas of the planned motor road of Khaishi-Mestia Corridor

№	Species	Status	Location
	Mammals		
1	Barbastella barbastellus	**VU**	*Construction Area*
2	Sciurus anomalus	**VU**	*Construction Area*
3	Sicista kluchorica	**VU**	*Nearby Construction Area*
4	Prometheomys schaposchnikovi	**VU**	*Nearby Construction Area*
5	Lynx lynx	**CR**	*Construction Area*
6	Lutra lutra	**VU**	*Construction Area*
7	Ursus arctos	**VU**	*Construction Area*
8	Capra caucasica	**EN**	*Nearby Construction Area*
9	Capra cylindricornis	**VU**	*Nearby Construction Area*
10	Rupicapra rupicapra	**EN**	*Nearby Construction Area*
	Birds		
11	*Aquila chrysaetus*	***VU***	*Construction Area*
12	Buteo rufinus rufinus	**VU**	*Construction Area (Hunting Zone)*
13	Neophron percnopterus	**VU**	*Construction Area (Hunting Zone)*

14	Gypaetus barbatus	**VU**	*Construction Area (Hunting Zone)*
15	Aegypius monachus	**EN**	*Construction Area (Hunting Zone)*
16	Gyps fulvus	**VU**	*Construction Area (Hunting Zone)*
17	Aegolius funereus	**VU**	*Construction Area*
18	Tetrao mlokosiewiczi	**VU**	*Construction Area*
19	Panurus biarmicus	**VU**	*Nearby Construction Area in aquatic zone*
Reptilian			
20	Vipera kaznakovi	**EN**	*Construction Area*
21	Vipera dinniki	**VU**	*Construction Area*
Fishes			
22	Salmo fario	**VU**	Medium and big size rovers
23	Varicorhinus sieboldi	**VU**	River Enguri
Invertebrate			
24	Phassus shamil	**EN**	***Construction or Nearby Area***
25	Eudia pavonia	**VU**	***Construction or Nearby Area***
26	Manduca atropos	**EN**	***Construction or Nearby Area***
27	Callimorpha dominula	**VU**	***Construction or Nearby Area***
28	Callimorpha quadripunctata	**VU**	***Construction or Nearby Area***
29	Axiopoena maura	**EN**	***Construction or Nearby Area***
30	Parnassius Apollo	**VU**	***Construction or Nearby Area***
31	Parnassius nordmanni	**EN**	***Construction or Nearby Area***
32	Allancastria caucasica	**VU**	***Construction or Nearby Area***
33	Erebia iranica	**VU**	***Construction or Nearby Area***
34	Polyommates daphnis	**VU**	***Construction or Nearby Area***
35	Zygaena fraxini	**VU**	***Construction or Nearby Area***
36	Bombus eriophorus	**VU**	***Construction or Nearby Area***
37	Bombus alpigenus	**VU**	***Construction or Nearby Area***
38	Bombus persicus	**VU**	***Construction or Nearby Area***
39	Xylocopa violacea	**VU**	***Construction or Nearby Area***
40	Rosalia alpine	**EN**	***Construction or Nearby Area***
41	Onychogomphus assimilis	**VU**	***Construction or Nearby Area***
42	Astacus colchicus	**VU**	***Construction or Nearby Area***
43	Eisenia transcaucasica	**VU**	***Construction or Nearby Area***
44	Dendrobaena faucium	**VU**	*Construction or Nearby Area*
45	Helix buchi	**VU**	*Construction or Nearby Area*

D. Economic Development

1. Power Sources and Transmission

422. After Georgia became independent, the process of energy sector rehabilitation was started, and this brought together the formation of electric power system as a separate independent structure. In particular, the generation plants were formed as independent electric power stations. Munisipality of mestia is a part of the system and in difference with the last year's energy crisis, now the limit on electric energy and accidents in the area per day decreased. The quality of reliable energy supply, also price rate indicator of electric energy use increased.

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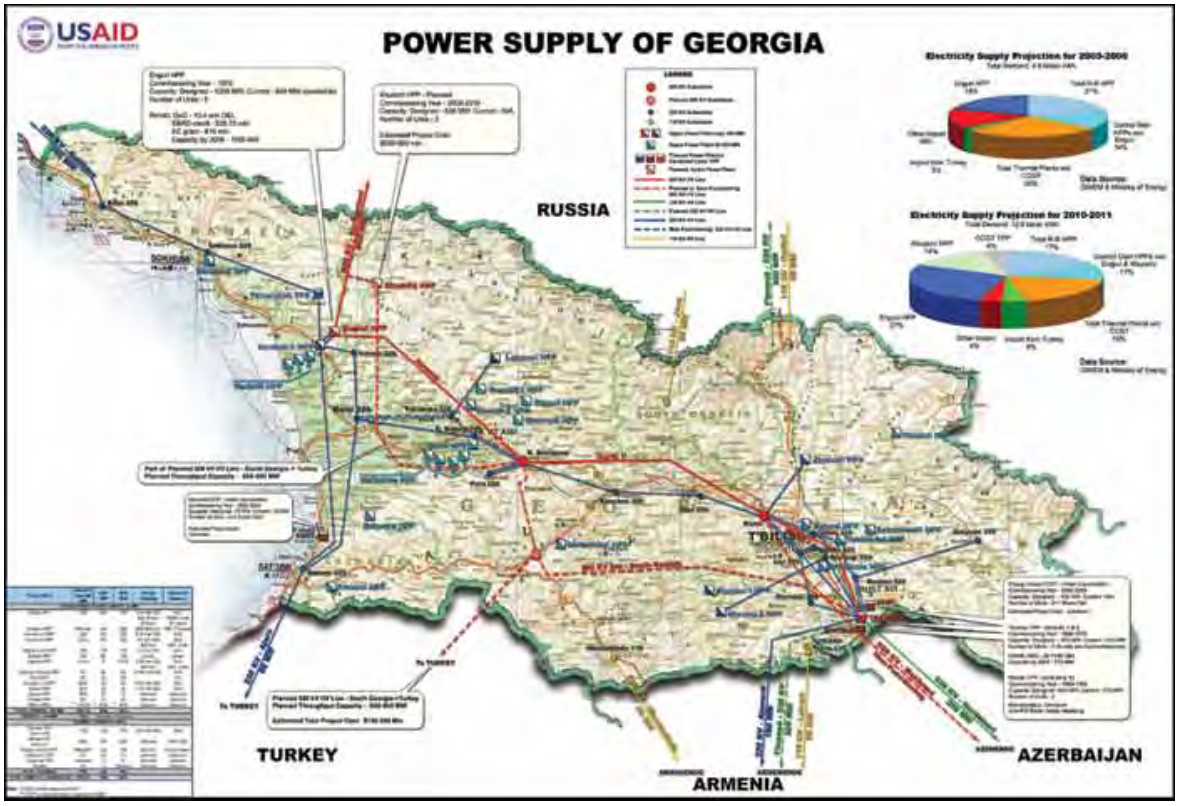

Figure 14 Power supply systems of Georgia

2. Tourism Facilities

423. Svaneti is the most beautiful region not only in Georgia but in whole Caucasus. There are lots of feudal era monuments, icons and churches.

424. Main peaks of the Caucasus Mountains and biggest glaciers, whose area reaches 300 km2, are located in Svaneti. The most important peaks are the following: Tsurungala (4220 m), Ailama (4550m), Shkhara (5068 m), Janga (5060 m), Gestola (4860 m), Tikhtingeni (4620 m). Tetnuldi (4860 m), Mazeri (4010 m), Chatini (4370 m). There is also Ushba's world famous two peak steep rocky massive (4700 m). The benchmark for difficulty and beauty in the Caucasus Mountains is Ushba and in the Alps - Matterhorn (4478 m).

425. Average absolute height of Svaneti Caucasus Mountains peak part is 4,125 m, the maximum height is 5,068 m (Shkhara), and the lowest is 3,168 m (Dongozuroni pass). There are about 20 passes of various difficulties in the section of the Caucasus Mountains; they are the passes to the North, to Russian Federation. The height of the passes fluctuates within the following range: 3,160-3,860 m.

426. Svaneti Ridge is the highest (the highest peak is Lahali, 4,010 m) among Southern ridges of the Caucasus Mountains, which represents divisor of rivers Enguri and Tskhenistkali. Its length is 120 km.

427. Svaneti vegetation is diverse. Coniferous forests start at 800-900 m elevation and alpine belt is from 2450-2500 m to 3100-3200 m. There are also broad-leaved forests with such tree species as Georgian oak, Caucasian hornbeam, lime-tree, mountain maple and etc. Central,

125 km section of the West Caucasus Mountains from Kodori ridge to Pasi Mountain is called Svaneti Caucasus Mountains. The region with highest elevation – Svaneti Region – is located on its South slopes; Svaneti Region's territory includes area from middle part of Rivers Enguri and Tskhenistkali gorges till their origins

Figure 12 Areas in Svaneti for verious types of turism

Lakes	Ugviri, Koruldi, Meziri (Tvebishi)
Cave	Zargashi (Mestia), Shgedi, Budebrivi Gamokvabuli
Picnic spots	In Mestia: Kakhuri, Hatsvali, Ugviri Pass, Ipari, Kali gorge.
Rafting	Mestia grove, Becho (Shikhi grove), Nekra (upper part), Ushguli
Fishing tourism	Chuberi, Lakhamula, Ipari (Adishura)
Horse riding	Mestia-Jabeshi-Adishi-Iprali-Ushguli (5 day tour, GEL 20 per horse, GEL 40-50 for a guide)
Mineral waters	Ushguli, Kala, Ipari, Mulakhi, 7 spots in Mestia, lenjeri, Tskhumari, Etseri.
Natural monuments	River Adishura, upper part; River Galde-Chaladi basin's upper part ("Perkhuli's Stone").
Hiking	Tviberi-Jabeshi, Chalaadi-Mestia, Ushguli-Shkhara glacier, Zuruldi-Mestia, Mazeri-Tvibeshi, Ushba glacier.
Camping sites	Everywhere
Skiing	_
Waterfalls	Dizshi, Mazerashi-Shdugvra
Viewpoints	Mestia, Zuruldi, Hatsvali, Gvaldi, Tskvzagari, Kheshkildi

E. Agricultural Development

428. Agriculture represents the major economical activity of Samegrelo-Zemo SvaneTi Region. During formation of the market relationships, the regional agriculture has established as a free market-oriented sector. Meanwhile, it shall be noted that the transfer from the planned economy to the market oriented system was very painful due to the weak agricultural strategy implemented in the end of 20th century, as well as in result of constraints associated with structural changes of the regional agricultural units with the later provoked by the loss of traditional trade markets. All above reasons leaded to amendment of the structural pattern of regional agriculture during 1990-2000. The land area used for production of the commercially viable tea declined by 91% accompanied with the drop of production value from 200 to 1 million US dollars (USD). In the same period, the cultivated crop area increased from 29.2 thousand to 70.2 thousand hectares, and the area of hazelnut plantations expanded to 19.4 thousand Ha, turning this fruit into the major export product of the regional agriculture. In addition, the new species as kiwi and feijoa entered the sector and currently the local production of these fruits effectively satisfies entire demand of the country's population.

429. Despite the considerable part of regional cattle breeding assets was concentrated in the former public sector – collective farms and Sovkhozs (state-owned farms), the total head of cattle and hogs had not reduced after liquidation of these facilities. Specifically, based on 2009 data, the total large cattle and hogs inventory comprised 214,913 and 17,217 heads respectively. However, the head of hogs and pigs significantly declined during the last two years due to spread of Montgomery disease.

430. Also, the ownership pattern of regional agriculture changed considerably. Replenishment of the homestead land parcels followed by the ambitious privatization carried out during the recent years significantly amended proportion between the private and state sectors. In accordance with 2009 statistics, 90,213 hectares, i.e. 33.6 percent of agricultural land was in the private ownership.

431. In result of considerable changes in distribution of the arable land within the region, at present 78.9 percent, i.e. 555,625 Ha of arable lots are privately owned, 4.3 percent is leased to farmers and only 14,796.8 Ha are in the state ownership.

432. The similar changes were implemented in distribution of the perennial crop lots leaded to transfer of 62.4 percent (27,455 Ha) of total area under perennials to private landowners, with 37.5 percent (16,518.3 Ha) remained in the state ownership, from which almost 10,000 Ha is used for tea farming.

433. In addition, it shall be noted that almost 100 percent of hayfields and pastures in the region belong to the state sector.

434. The regional agricultural sector has possibility of both extensive and intensive development with the later meaning inclusion of the state-owned wild ground (abandoned land) and unused agricultural lots into agricultural production process through privatization.

435. All abovementioned resulted in gradual growth of the agricultural production as evidenced in the following diagram.

F. Mineral Development

436. The region is distinguished by abundance of mineral water sources comprising more than 200 springs. Mestia District is known by its gold, silver, molybdenum, barite, arsenic, wolfram and marble deposits. The geothermal water sources are located in Tsalenjikha, Chkhorotsku, Zugdidi, Khobi, Martvili and Senaki Districts with the total daily flow of 35 thousand cubic metres. From these, Zugdidi-Tsaishi geothermal field has the highest capacity, with rated flow currently estimated as 14,300 m^3 of 80-100 ^{0}C water per day.

437. There are four major peat deposits in the region, Anaklia (Zugdidi District), Churia and Nabada (Khobi District), Otsantsaleshi (Martili District). Besides these, there are several smaller capacity peat sites as Chataukali (Zugdidi District), Chkhopi and Etseri (Martvili District), Tsakipuli (Khobi District). The total reserve is 48 million tones with total economical value of 333.2 million USD.

438. Various non-ferrous metals extraction sites operate in the region, which forecasted reserves are as follows: gold – 103.7 tones, lead – 300,000 t, zinc – 370,000 tones, copper – 376,000 t, cobalt – 6,000 t, silver – 8.4 t. The total estimated economical potential of this production is 2,985.86 million USD.

439. Facing stone materials are extracted in Martvili, Mestia and Chkorotsku Districts from the deposits of igneous rocks with total estimated reserves of 6,475 thousand cubic metres and potential economical production value of 317 million USD. The estimated volume of marble reserves in Mestia District is 2,992 thousand m^3 with economical production value of 441 million USD. The limestone deposits usable in facing are located in Mestia, Martvili and Tsalenjikha Districts and have the total estimate capacity of 1,089 thousand m^3 with economical value of 75 million USD. The sources of saw rock and debris materials are represented by limestone deposits located in Martvili, Senaki, Chkhorotsku and Tsalenjikha Districts and have the total estimate reserves of 25,033 thousand m^3 with economical value of 248 million USD. The quarries of construction sand and gravel material located in Senaki, Abasha, Chkorotsku and Tsalenjikha Districts have the total estimate production capacity of 1,089,119,162 thousand m^3 and economical value of 952 million USD. The lime is extracted at limestone deposits of Mestia, Senaki, Zugdidi and Tsalenjikha districts, which total estimated reservs account to 102,418 thousand m^3 with economical value of 79 million USD. Brick earth barrows are located in Tsalenjikha, Chkhorotsku, Zugdidi, Senaki, Martvili, Khobi and Abasha districts and have the total estimated reserves of 13,267 thousand m3 with economical value of 249.8 million USD. The total estimate capacity of gypsum and anhydrite deposits located in Tsalenjikha District is 12,584 thousand tones with economical value of 319 million USD. Barite deposits are located in Mestia, Tsalenjikha, Martvili and Zugdidi districts, but no estimated capacities are available. Besides above, the region has the reserves of fresh water, healing water and minerals and gemstones. The total economical potential (value) of the on-balance regional natural resources - 3,439.4 million USD; forecasted resources – 2,996.9 million USD; The gross economical potential (value) - 6,436.3 million USD.

G. Social and Cultural Resources

1. Population

Munisipalities	2001	2002	2003	2004	2005	2006	2007	2008	2009
Samegrelo-Zemo SvaneTi	**460.6**	**466.1**	**462.8**	**459.5**	**460.4**	**471.0**	**469.8**	**467.7**	**468.0**
Poti	45.2	47.1	46.7	46.5	46.7	47.3	47.3	47.4	47.5
Abasha municipality	26.4	28.7	28.4	28.1	28.1	28.2	28.1	27.9	27.8
Zugdidi Municipality	186.4	167.8	166.7	165.7	166.2	172.2	172.1	171.4	171.6
Martvili Municipality	41.3	44.6	44.3	44.0	44.2	44.8	44.6	44.4	44.4
Mestia Municipality	10.7	14.3	14.2	14.0	14.1	14.1	14.2	14.3	14.4
Senaki Municipality	51.2	52.1	51.8	51.5	51.4	52.2	52.0	51.7	51.7
Chkhorotsky Municipality	26.2	30.1	29.9	29.6	29.6	30.2	30.0	29.8	29.8
Talenjikha Municipality	35.5	40.2	39.9	39.5	39.5	40.5	40.3	40.0	40.0
Khobi Municipality	37.7	41.2	40.9	40.6	40.6	41.5	41.2	40.8	40.8

Source: Official data on regular inhabitants of Samegrelo-Zemo Svaneti during 2001-2009.

440. In the mestia Municipality 99% of population is ethnically Georgian.

2. Health Facilities

441. The network of 22 stationary healthcare facilities is operating in Samegrelo-Zemo Svaneti Region. Based on statistical data, annual load of these facilities is 14,380 patients. The healthcare sector employs 1095 doctors and 1554 medium-level medical personnel. From these, 11 employees hold the highest medical scientific degrees (1 doctor and 10 candidates of medical sciences). The municipal and central district hospitals are equipped by clinical, x-ray

and functional diagnostic laboratories, as well as have the endocrinology and ultrasonic diagnostic offices and anaesthesia and intensive therapy departments. The cardiology centre "Guli" located in Zugdidi operates 2 reanimobiles. In 2008, Gejati ambulatory of city of Senaki was improved and fitted with the state-of-the-art medical equipment under the framework of Presidential Program. This facility served 984 patients during 10 months. In addition, the same Presidential Program provided modern equipment for Nosiri ambulatory, which served 1748 patients during 10 months.

442. The St. Luka Medical Centre of city of Zugdidi established on the basis of Republican Healthcare Complex shall be specified, which fully complies with the modern standards. During 10 month, this centre provided healthcare services to 4,500 stationary and 21,000 ambulatory patients.

Figures 15. Mestia ambulance office

Figures 15. Mestia ambulance staff

a. Mestia Branch of Social Service Agency

443. In accordance with 1 January 2010 statistics, 3,025 pensioners are registered in Mestia District, including 34 war veterans and 406 various category disabled persons. From the 2,380 households recorded in the district, 620 are registered as indigent (below poverty level). Number of district residents provided with health insurance policies is 4,175.

3. Education Facilities

444. Based on information of the Ministry of Education and Science of Georgia, 282 secondary schools (including 25 one private ones) and 3 orphanages operate in Samegrelo-Zemo Svaneti Region.

445. In Mestia District there are 24 secondary schools with 2,117 pupils, school children's house, four sport schools, art school, music school, central and village libraries, village clubs and cultural centres.

446. From the villages located immediately along the road the full-fledged (grades 1-12) public schools are in Pari (Fig. 17), Etseri and Becho. The primary schools (grades 1-4) are in Qvemo Luha, Ladreri and Qartvani (Fig. 18). No public schools are in Nogari, Lakhani, Zemo Luha and Lankhvari, from where children go to schools located in the nearest villages.

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Figurei 17 Village Fari

Figure 18 Vollage Ladreri

447. From the 21 state and 108 private higher education institutions, which are certified at present by the Ministry of Education and Science of Georgia, the following two are located in Samegrelo-Zemo Svaneti Region:

(i) Shota Meskhia State University (opened in 2007)
(ii) Zugdidi Independent University.

4. Physical or Cultural Heritage

448. Khaishi-Mestia Motor Road practically entirely runs along Enguri River valley. Below are listed the various age and nature monuments/artefacts discovered incidentally or through archaeological excavations at the settlements located along this valley and its branches.
In 1969, during construction of Enguri Hydro Power Plant, the multi-layer archaeological monument was destroyed, which based analysis of recovered items belong to II-I Millenniums B.C.

449. Village of Khaishi – Khaishi Treasure, I c. B.C – I c. A.D.; discovered in 1948 during conduct of earthworks. The treasure included: silver bowls and drinking vessels, gold adornment, necklaces, buckles, pendants decorated with images of fabulous animals and figures of musicians playing on reed-pipe and 'chianuri' (string instrument).
In the same village, the 'baksania'-type metal casting furnace was destroyed due to blasting; the bronze ingots survived. Khudoni fortress is located in the same village.

450. Chuberi Community – Early ancient period (VI-IV c.c. B.C.) burial ground has been studied, which was discovered during archaeological excavations carried out at the left terrace of Nenskra River (left tributari of R. Enguri), at Larilari Site. The cremation platforms graded by stones and compacted clay revealed. It was been identified that the deceased was burned together with the enclosed personal possessions. Thousands of items were discovered: ceramic vessel, metal tools and armaments, bronze-made plastic images of the sheep, bull, horse, dog, wild goat and bird; beads made of glass, pasta, amber, agate, bronze and other material; glass pendants and amulets with bird images. Large quantity of bronze bracelets, buckles, bells and fibulas decorated with astral and animal-faced art images. Among the particularly distinguished artefacts discovered at this site were the horse tack elements including the strap clasps, metal bit and images of the horse head and neck painted on the ceramic vessels. Also, along with the local products, the items made in various Greek and Asian civilization centres were discovered including Phoenician and Egyptian polychromatic glass beads, and black/red varnished Greek ceramic drinking containers.

451. In addition, the metallurgical production remains were identified in the same community, at Skhibra Site with the smaller portion excavated (VII-VI c.c. B.C).

452. The medieval fortresses and cult structures were found within the village of Idliani of the **same community**.

453. Village of Ipari - the incidental archaeological artefacts comprising the bronze items were discovered.

454. Village of Dizi – the incidental archeological artefacts comprising the metal plough and Late Antic burial items.

455. Etseri Community – Early Antic period (VII-IV c.c. B.C.) settlement mound was discovered. The dwelling surrounded by stone masonry wall; cult worships (IV c., alters), entire complex of household structures. The walls of structures mainly are built by stone masonry using the clay mortar. The rich archaeological material was revealed, including the particularly important items as bronze hoes, iron ploughs and ancient grain crop species.

456. In the same community – smaller scale archaeological excavations were carried out at the remains of Lamaria Church.

457. At village of Ledredri of the same community – in 1932, during road construction works, the bronze daggers and crescent was discovered together with the ceramic vessels (X-VII c.c. B.C.), which are stored in Mestia Museum.

458. In 1974, during construction of Mestia-Zugdidi motor road, the medieval burial ground was disrupted **in village of Etservi**. Later the inventory of glazed ceramic bowls, glass containers for perfume and parts of the black-burnished silver belt were found among the local residents employed at construction works.

459. In Tskhumari Temi – the remains of medieval structures were completely destroyed at Tvirbishi Site during rock excavation for construction of the local kindergarten. Later smaller portion of discovered material (ceramics, hand-mills, pestles) were collected from local residents.

460. Village of Qartvani of Becho Community – the cultural archaeological layers were destroyed during grading the yard for construction of the private residential house. The part of discovered items, including the bronze daggers, disk-shaped clasps, and bullhead and sheep sculptures were delivered to Mestia Museum. Based on results of analysis of the discovered items, the specialists assume that this site should be a burial ground.

461. Latali Community – more than 30 various period archaeological monuments were recorded by Archaeological Expedition.
Lenjeri Community –incidental discovery – black varnished Greek lekythos (oil jar) aged VI-V c.c. B.C.

462. Mestia Community – known incidental discovery – Egyptian Scarab Beetle.

463. Numerous incidentally discovered artefacts were found and several archaeological sites were excavated in upstream villages of Enguri Valley including Ushguli, however at this time they are out of our consideration area.

464. It shall be emphasized that the list provided above includes only part of the monuments/artefacts which were possible to locate along the study road alignment using available references. Unfortunately, in the specialist references the exact locations of the monuments are specified in selfdom or almost are not provided at all.

465. The cultural and historical heritage samples of highland part of historical Colchis listed above have the function of original source material for highlighting not only the past of Colchis, but for studying the remote history of other Georgian tribes occupying the entire Caucasus highland, and identification of their role and importance in the Georgian history. These artefacts and monuments also contribute to improved knowledge about the history of trade, economical and cultural relationships with the neighbouring and remote countries.

466. Based on all above, we believe that it is necessary to undertake supervision of the reconstruction works along the entire road alignment by respective specialists to avoid recurrence of the previous adverse cases and exclude destruction of the cultural heritage of this important Georgian region.

467. Such consideration leads to necessity of applying the careful approach to the earthworks, adherence to the archaeological management procedures and engagement of employees of the Ministry of Culture and Archaeological Research Centre in case of archaeological discoveries.

5. Historical Sites,

468. The scope of cultural heritage monuments of Mestia District comprises 45 churches with frescos in Mestia District, as well as other 107 churches, 311 Svanetian towers and more than 100 Svanetian Houses (Machubi).

(i) Church of the Saviour (Matskhvari) in vil. of Chvabiani of Muzhali Community was built in X century. The structure has protruded apse. Its interior is equipped with five-arched iconostasis. The apse was painted in the same X century, during reign of Bagrat III. The painting is distinguished by its refined colouring. The precious sky-blue paint was used that is unique for Svanetian paintings. The church was repainted in XIII c.

(ii) St. Kvirike, the St. Ivlite church (Svanetian name – Lagurka) is located in village of Kala, single-nave church. In medieval centuries this church comprised the monastery complex. The church was painted in 1112 by royal painter Tevdore, who previously in 1096 painted the Archangel Church in Ipari. The entire treasure of Kala Community is secured in the church, including the medieval embossed and painted icons. The enamel-decorated icon of holy relics called Shaliani Icon by Svans.

(iii) Saint George church in village of Nakipari was built in X century using the yellowish calcareous tuff. It is the single-nave chapel, which eastern facade is decorated by painting and sculptured animal images (bull, chamois, deer, lion and bear). The interior was painted in 1130 by royal painter Tevdore. The painting is very impressive and is distinguished by interesting art techniques. The special attention is attracted by the vault painting representing the known version of supplication, and heraldic type images of the Saint Riders (Saint George and Saint Tevdore) painted on the north wall. The embossed icons of XI-XII-XIII centuries are secured in the church, as well as the Saint George icon made by Asan, gold-smith living in XI c. (ordered by Marushin). The church is functional.

(iv) Church of the Saviour (Matskhvari) is located in vil. of Latali, Mestia District. This X century church is of single-nave type and is built of calcareous tuff. Interior was painted by Mikhael Maglakelidze in 1140, in the 15th year of reign of Demetre I that is noted by Asomtavruli writting. The painting is characterised by emphasized decoration. The image of inauguration ceremony of Demetre I is painted on the north wall. The church is rich with medieval painted icons. Also, the church houses the byzantine pictoral cross of XII century adorned by enamels using the plique-a-jour technique. The church is functional.

(v) Lagami Church of the Saviour (Matskhvari) is located in village of Lagami, older Mestia. This is two-storey single-nave church. The wall painting of the first and second floors are of X and XX centuries respectively. The interior and facade of the second floor are painted in XIV century.

(vi) The ancient dwelling complex of Margiani brotherhood is located in Lanchvali, historical section of Mestia. The complex was built in XIV c. and comprises 'Machubi' (dwelling house) with large hall, summer terrace-type structure 'Guband' and adjoining multi-storey tower built by large stone quadrants.

(vii) Svaneti History and Ethnography Museum. The museum was established in 1936 by ethnographer Egnate Gabliani. The exhibition halls and storage facilities of the museum house very important samples of the Christian culture. The cultural and material monuments kept in the museum are characterised with widespread chronology from the archaeological artefacts of III Milenium B.C. to the Common Era monuments.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Design phase

N	Project Related Impact	Yes/No	Comments
1	Route alternatives and impact: • Geo hazardous areas • Sensitive ecosystems • Land use	Yes	In terms of impact on land use and private households and crossing sensitive ecosystems the rehabilitation of the existing road corridor and utilization of new land is recommended. However, the existing road crosses some sections hazardous in terms of landslips and with the aim to mitigate risks the selection of optimal route could be better
2	Alternative places for inert material quarries, waste disposal areas, asphalt making, builders' camps, fuel filling and material storage territories	Yes	Air pollution with dust / emissions depends on the appropriate selection of working areas (away from residential areas). For landscape impact minimization less sensitive landscapes will be chosen
3	Soil erosion, instability and road wash out caused by slope erosion; river pollution with sediments	Yes	Complete project is significant to reduce these negative impacts: project of temporary and permanent drainage systems, reinforcement structures, berms and earth fills, project on anti-erosive engineering constructions and restoration plan
4	Planning, selection and design of cross	Yes	Improvement of safety and local travel.

	sections		
5	Compliance with international technical standards	Yes	Effectiveness of safety, exploitation and maintenance / repair
6	Noise and emissions related with automobile traffic	Yes	Significant impact of emissions and noise on those residential areas is not anticipated which are more or less away from the designed automobile road section
7	Artificial constructions, drainage systems and other road infrastructure	Yes	Appropriate design determines the sustainability and safety of infrastructure elements. The landslip-gravitational processes are anticipated on the mentioned section of the highway: landslips, rock slips, avalanches. Mudflow centers are less dangerous. The risk of the development of erosive processes also exists. Within these conditions appropriate design of drainage systems and other protective constructions of surface waters and slope waters is important
8	Damage to other infrastructural elements	Yes	Risk of damaging electricity lines and towers. The project should provide for the protection or moving of the existing towers

Construction Phase

N	Project Related Impact	Yes/No	Comments
1	Elimination or long term degradation of the natural landscape (relief, soil, vegetation, habitats and wildlife) within the right of way	Yes Insignificant	Along the RoW
2	Long term degradation of the natural landscape (relief, soil, vegetation, habitats and wildlife) at the access roads, pits, areas of allocation of solid waste, construction areas and equipment storage yards	Yes medium	In the waste disposal areas From incorrect exploitation of borrow pits.
3	Landslips and other hazardous gravitation processes, land subsidence, risk of stimulation of landslip and gravitation processes as a result of construction works	yes	Km 109, 114 and 120
4	Provocation of erosion by land works and disruption or filling (as a result of filling with sediments) of natural drainage channels connected with the road construction and under the road surface caused by concentrated flow from surface or underground drainage channels	Yes medium	Along the RoW
5	Increase of average weighed sediments in	Yes	Along RoW and bad of River rioni

	surface water objects (rivers, rivulets, lakes) as a result of erosion and earthfill washing connected with the construction. Deterioration of water quality and increase of sediment volume	medium	
6	Impact of the construction of the water ecosystems of rivers, rivulets and lakes, which shall be crossed by the highway. Indirect impact related to possible turbid processes in r. Enguri caused by sediments washed during land and concrete works. Increase of sediments due to intensified erosion	Yes Medium, indirect	Impact related to possible turbid processes
7	Pollution of soil and water with oil, lubricants, fuel and paint (construction corridor; equipment storage and asphalt factories)	Yes Medium,	Construction camps.
8	Impact connected with the debris and construction waste. 260000 m^3 debris will be created during the road rehabilitation	Yes important. Most important problem of the project	Along the RoW.
9	Waste within construction corridors and road; bad sanitary conditions in construction camps and areas (sewage, sanitary conditions, waste management)	Yes Medium,	Along the RoW
10	Air pollution by construction equipment and transport in residential areas, which are crossed by the highway. Among these especially notable are district centers and densely populated villages. Dust on construction areas and access roads	Yes Medium,	Nearby the villages along the RoW
11	Air pollution by asphalt factories	Yes Medium,	Dama Mestia and village Dgorkvali (Asphalt plants location areas)
12	Negative impact of car noise in residential areas, which are crossed by the highway. Among these especially notable are district centers and densely populated villages	Yes Medium,	Nearby the villages along the RoW
13	Poaching of construction workers	Low	River Enguri
14	Creation of favorable temporary natural habitats for disease carrying insect breeding (artificial puddles, etc), pooling of water in pits, etc. All these are favorable for mosquito breeding and carriage of diseases. Pollution with biological material during land works in the vicinity of mounds (among these, unregistered) (i.e. anthrax)	Yes Medium,	Along the RoW
15	Negative impact of noise dangerous to health and emissions by transport, creation of dust during construction	Yes Medium,	Nearby the villages along the RoW
16	Impact on archeological monuments	Yes	Along the RoW
17	Creation of dangerous conditions for	Yes	Nearby the villages along the RoW

	vehicle at the areas where the construction involves functioning roads	Medium,	
18	Impact on existing infrastructural elements: high voltage transmission lines	Medium or high	Along the road
19	Risk of casualties connected with cars and other transport, which could result in spill of toxic substance, exploding of explosive cargo, death or damage to people	Yes Medium,	Along the road Nearby the villages along the RoW

A. Mitigation Measure: Design of Landslip Sections

469. Normal functioning of the automobile road is especially complicated by landslips formed in tectonically unstable slate strata; their deformation depth lies within dozens of meters and their development-activation takes place through integration of complex factors, where earthquake effect has one of significant roles. In these terms the landslip sections are noteworthy: 109 km, 114 km, "Malaia Tvibra" landslips. Complete stabilization of the landslips through engineering constructions is impossible. For the preservation of their dynamic balance we recommend the measures proposed during the characterization of these landslips.

470. Proceeding from the most complex geo-morphological conditions and geological-tectonic structure no alternative of road location is possible – neither on the same slope nor on the second side of the river, because geological processes are widely developed on the mentioned slope and if the slope is newly processed, the processes will develop at larger scale. We consider the preservation of the existing road and implementation of appropriate restoration measures throughout the exploitation as the right decision.

471. Surface landslips are mainly formed in the slope sediments and zones of actively eroded zones and do not pose significant threat to automobile roads. Their majority is formed in the lower junction zone of the road and mostly is developed into debris. The handling of the debris via gabions is not very difficult.

472. As general recommendations we should note that some of preventive measures could be implemented:

(i) Removal of actively dynamic landslip formations at the upper slope of the road and the slope should be given the stable inclination;
(ii) Systemic removal of surface and ground waters outside the landslip body and not causing additional watering of the lower slopes;
(iii) To prevent road surface deformation arrange gabion below.

473. The exploitation of Zugdidi-Mestia automobile road will be much impeded by landslip on the 109th km. To facilitate normal use of the road the removal of the actively dynamic landslip body, cutting the road into the slope, its shaping into steps and organized removal of surface waters are needed; arrangement of gabion in the lower part of the road is desirable.

474. Mala Tvibra landslip section is located on the right slope of r. Enguri gorge on the 114th km of the automobile road, on the territory of village Fari. Proceeding from the activity of the landslip processes long-term capital anti-landslip measures to facilitate the normal functioning of the road are useless. Some preventive measures should be implemented, namely:

(i) Removal of actively dynamic landslip formations at the upper slope of the road and the slope should be given the stable inclination;

(ii) Systemic removal of surface and ground waters outside the landslip body and not causing additional watering of the lower slopes;
(iii) To prevent road surface deformation arrange gabion below.

475. To reduce the landslips developed as a result of precipitations (i.e. village Becho, 120 km) regulation of surface waters is needed.

1. Planning of the Measures to Be Implemented on the Mudflow Sections

476. Along the automobile road in the distribution area of Jurassic clay-slates and carbonate flysch mudflow transformation is common, which results in rock-muddy debris periodically threatening the normal functioning of the transport. Proceeding from the above, periodic cleaning- straightening and deepening of the mudflow ravine beds is needed. Implementation of other capital anti-mudflow measures is difficult and the result is less reliable.

B. Allocation of Inert Material

477. At the stage of rehabilitation works on Khaishi-Mestia section of the automobile road the main environmental problem is the allocation issue of the debris. As a result of drilling-explosion and land works the total amount of debris is 260 000 m^3. Debris is formed in River Enguri floodplain and if left there, it shall eventually be washed to Enguri Power Station reservoir.

Mitigation Measures

478. The prevention of the anticipated harmful results is necessary through planning of appropriate measures.

(i) Debris should be removed from r. Enguri floodplain for about 3-5 km;
(ii) Prior to carrying debris to the allocation area, in the section where the above process is somehow impeded or requires time debris should be collected in the temporary area of allocation. The area of temporary allocation should be selected and arranged to maximally minimize the washing of the debris by river flow to lower tail waters;
(iii) The selection of the temporary allocation areas is recommended in the meander sections of r. Enguri, where river flow has less velocity and bed trajectory reduced the possibility of washing;
(iv) It is recommended not to chaotically put debris in the temporary allocation areas, but arrangement in the outer perimeter by large fraction of boulders. The diameter of large boulders should be selected to form effective barrier of protection from washing of smaller stones. The system of appropriate gabions could be used;
(v) Construction contractor should develop specific plan of temporary and permanent allocation of debris, where the following should be noted: areas of debris allocations; engineering project of allocation (plan, section, etc.); transportation plan; temporary and permanent allocation plan dholes be agreed with the local authorities and regional service of the protection of the environment and natural resources.

C. Blasting Works

479. During road reconstruction and rehabilitation works, according construction plan it is necessary to use blasting activities which maybe cause seismic impact, flying of the rocks as well as noise and dust along the site.

Mitigation Measures

480. The holes are undermined and exploded. Blasting shall be done in intervals. Intervals between blasting are preserved in order to avoid seismic impact on power lines located along the site as well as to avoid fragments of rock damaging the lines.

481. The order of blasting works shall be preserved as follows in order to avoid flying rocks: the block shall be exploded - at the first stage blast-hole charges are exploded in order to loosen the hillside soil on the side of the road. The soil shall be loosened to such a condition that it will not happen on the road. The rest of the blast-hole charges shall be exploded three times with insignificant intervals between them and the soil loosened at the first stage working as a protecting screen in the process of the following explosions to stop flying rocks whilst massive explosions.

482. Miner-rock climbers shall be equipped with ropes and other tools (crowbar and jack hammers).

483. They climb the natural platform using the bypass road. Safety area may be constructed on that platform. The worker shall be tied up with Capron rope. The second end of the rope shall be fixed on the tree or on some other solid object. Other two workers hold the worker and loosen the rope slowly as he gets down the mountain and regulate the tension of the rope. The area of sliding of boulders and debris shall be fenced with concrete blocks. The workers shall safeguard the road from both sides nobody to enter the dangerous section. The road shall be closed and furnished with corresponding road signs and temporary fencing. The workers shall wear protective clothing and gloves as well as hard hats.

484. The above-mentioned works are altitude works requiring strict adherence to safety procedures applied in corresponding cases. The group of representatives of energy supply shall be present on the site in case power lines are damaged to repair them (in such a case the expenses are no included on the design and they shall be covered from contingencies).

485. Blasting works generally shall be done by specialized authorities and team and only when the corresponding Works Productions Plan is available, in accordance with the Project of Production and Organization of Blasting works.

486. Safety requirements set forth in Overall Safety Requirements shall be preserved. Blasting works shall be altogether done by specialized agency, teams. The works shall only be done upon the delivery of Works Production Plan. Optimal quantity of explosives shall be determined and defined on site by means of advanced blasting (test explosion), taking into account properties and geological structure of soil. Blasting works shall be performed in the direction opposite to the protected object.

487. Charges in the holes shall achieve the depth of 0.7 m. The rest of the space is used for placing soft soil (do not use gravel and crushed stones for this purpose). Charges shall be initiated by power, which is safer and is more effective.

488. Adhere strictly to safety procedures whilst conducting blasting works. Blasting of soil shall be done in accordance with valid standards, particularly “Overall safety procedures whilst conducting blasting works”.

489. Blasting works, which belong to severely dangerous types of works, shall be approached with great care. Highly qualified and specialized member of staff can be nominated to direct blasting works.

490. Determining the limits of the site and fencing shall be done in advance. Observation (security) Posts shall be located on the site so that all the roads adjoining the site can be permanently observed. Chief of blasting team shall position Observation (security) Posts.

491. Boring is available during twenty-four hours, whilst blasting only in the daytime. Blasting works are prohibited in unfavorable weather conditions such as lightning, rain, fog. Evacuation of people from the dangerous site shall take place after the charges are ready to blast.
The Guards shall be located so that to protect the site. Smoking and fire are prohibited within the radius of 100 m from the site.

D. Noise and Air Quality

492. Noise and emissions of harmful substances are typical impacts of construction. However, in the case of this project, it is clear that there will not be any significant impact on the environment due to noise or air emissions. Therefore, no special measures are necessary to mitigate any impacts. Rather, the rules required by the building practice and norms should be sufficient to observe and carry out monitoring (check and repair all vehicles).

493. Regarding air qualities during construction of the project, the following types of emissions are expected:

(i) • Emissions from motor engines (bulldozers, cranes, excavators, compressors)
(ii) • Dust due to earth works and driving of techniques along the ground surface.

494. The emission rate of inorganic dust during the operation of the road building techniques (excavators, bulldozers, mobile cranes, etc.) and the emissions caused by engine operations is estimated. Most of them run on diesel. The emissions caused by the building machines are also estimated by effective normative documents and reference literature. By using the tables given in the reference documents the gross annual emissions of the techniques or gross annual emissions during the project and maximum one-time emissions may be calculated.

Mitigation Measures

495. The residential and public area is located closely to the construction site. It will not be affected significantly by the construction related emissions. However, emissions of heavy machinery involved in the construction should be managed by a proper engine maintenance practice and use of good quality fuel. The work of engines in an idle mode should be excluded.
A relatively high impact is related to 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 a temporary impact, and should be mitigated by periodical watering of the work sites.

496. The residential and public areas will not be disturbed significantly by the noise nuisance. Mitigation of this impact is possible by employing the engine maintenance practice and avoidance of engine work in an idle mode. The limitations that could be recommended are:

(i) to prohibit the night-time (10 pm and 6 am) works .
(ii) to limit the works performed near the residential or public houses to the absolutely necessary site-related works and to carry out all auxiliary noisy works (like crushing conglomerates, milling demolished asphalt etc.) at sufficient distance from residential houses.
(iii) All vehicles shall be maintained so that their noise and emissions do not cause nuisance to workers or the local people.
(iv) All vehicles will be checked and repaired in case of need to eliminate increased level of noise due to damaged parts.

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

498. Vehicle refueling shall 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 store the fuel).

499. If it is 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:

(i) Damping down using water browsers with spray bars or other technical means; Minimum 1 browsers should be required for that purpose. However, the construction contractor should not be limited by this figure, and if required additional browsers should be engaged.
(ii) Sheeting of construction materials and storage piles; and
(iii) Use reductions in vehicle speed where required. Materials will be transported to the site in off peak hours.
(iv) Materials transported to the site will be covered/ wetted down to reduce dust. The construction site will be watered as appropriate. Personal 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 the damaged parts;

E. Hazardous Construction Wastes

500. Small quantities of hazardous wastes will be generated as a result of vehicle operations and the maintenance activities, including:

(i) bitumen;
(ii) liquid fuels;
(iii) lubricants, hydraulic oils;
(iv) chemicals, such as anti-freeze;
(v) contaminated soil;
(vi) spillage control materials used to absorb oil and chemical spillages;

(vii) machine/engine filter cartridges;
(viii) oily rags, spent filters, contaminated soil, etc)

Mitigation Measures

501. There are no specific hazardous waste treatment facilities in Georgia, so the common construction practice accepted by the authorities is to dispose of these types of wastes at the municipal landfills. However, prior to disposal appropriate consultation and agreement of MoE is required, and controlling will be required to obtain the necessary approvals. To ensure good practice they will also be required to store, transport and deposit all hazardous materials in secure watertight containers.

502. Contractors will be required to ensure the proper handling of all hazardous materials, including liquid fuels, lubricants, hydraulic oils, chemicals, such as anti-freeze, contaminated soil, materials used to absorb oil and chemical spillages; machine/engine filter cartridges; oily rags, used filters, contaminated soil. Storage containers for these materials should not be located within 50m of any watercourse in this case the River Mtkvari. All containers should be placed in a bund of at least 110% of the tank's maximum capacity. If more than one container 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.

503. The bund should be impermeable (e.g. concrete-lined), without drainage points or other breaches. Accumulated rainwater in bunds should be pumped out of the bund to either drains or onto the ground if uncontaminated. In case of fuel spillage the spilled fuel should be recollected and the contaminated bund shall be treated using the absorbents: sawdust, sand or straw.

F. Soil Pollution

504. There are a number of materials need in a project of this type, which can pollute both soil and water if spilled or improperly disposed of. These include:

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

Mitigation Measures

505. Specific mitigation measures should be implemented on the construction site to prevent the soil pollution.

506. Contractors should ensure the proper handling of lubricants, fuel and solvents. All tanks should 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.

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

508. Vehicles should not be left without the supervision during refueling process. All refueling operations on the working sites should use absorbent pads and/or straw to minimize spills, which shall be put in place prior to the commencement of refueling operations.

G. Water Pollution

509. Water pollution may result from a variety of sources, including the following:
- (i) Spillages of fuel, oil or other hazardous substances, especially during refueling
- (ii) Silt suspended in runoff waters from the construction site
- (iii) Washing of vehicles or equipment or disturbance of watercourse banks and bed when crossing the watercourse by a heavy machinery
- (iv) Exposure of contaminated land and groundwater

510. Spillages, etc may travel quickly downhill to a watercourse or water body which in this case is located immediately alongside the site (River Rioni). 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 a 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. When implementing the earthworks in a wet weather this may result in uncontrolled release of suspended solids from the work area.

511. Topsoil stripping on the work sites and trenching may result in increased erosion runoff and contamination of surface water.

Mitigation Measures

512. Specific mitigation measures should be implemented on the construction site in order to prevent water pollution.

513. Contractors should ensure the proper storage and handling of lubricants, fuel and solvents by following the storage and pollution prevention measures proposed above.

514. No fuel storage or refueling of vehicles or equipment should be allowed within 50m of river Rioni, or near drainage channels. Vehicles should not be left without the supervision during refueling process. All refueling operations on the working sites should use absorbent pads and/or straw to minimize spills, which shall be put in place prior to the commencement of refueling operations.

515. The risk of Ground water and surface water pollution should be reduced or eliminated by the measures outlined above, and by prompt action in the event of a spill, to contain and clean up the material and remove the polluted ground. Soiled ground and absorbents should be removed, stored and treated as a hazardous waste as described above. In case of a significant spill an authorized and responsible person should be informed, works shall be stopped till the pollution has been removed. Refueling shall 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 equipment should be regularly checked to prevent leakage due to inappropriate condition of refueling equipment. Equipment and storages should be isolated and guarded to prevent pollution due to cases of stealing or vandalism. All mobile plants, including

but not limited to cranes, compressors, generators, bulldozers, excavators etc. and storage tanks should be maintained and operated in such a way that all leaks and spills of materials should be minimized. Daily plant checks (Vehicle Maintenance Procedure) will be undertaken to ensure that there are no leaks or other problems. Vehicle maintenance, cleaning, degreasing etc should be undertaken in designated areas of hard-standing, not over the 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 river Rioni, or near drainage channels. The storage of potentially polluting materials, refueling and maintenance of mobile plant within 50m of all watercourses/water bodies, dry riverbeds should be prohibited.

516. Erosion control measures should be applied during the construction activities to prevent runoff of into the River Rioni. The contractor should 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 the river by selecting areas that are not free draining into any watercourse.

517. Where any area of the spread is at risk from silt pollution washing off into a watercourse of water body, effective measures should be put in place to ensure that such pollution does not occur. Contractors should be required to implement such measures as:

(i) Use of silt fences
(ii) Use of straw bales to deflect and filter water
(iii) Use of a system of bunds and grips to prevent water from entering watercourse, etc.
(iv) 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.

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

H. Transport related impacts

519. The construction process will produce large number of movement by heavy trucks on the roads served the site, delivery construction materials and excavation waste for use or disposal. This can cause a number of impacts, including:
Heavy trucks are required to deliver required amount of inert materials to the needed sites within the construction site. Different types of impacts are anticipated in that regard:

(i) Noise & Vibration;
(ii) Traffic congestion (nuisance);
(iii) Air pollution (dust; emissions);
(iv) Mud on roads;
(v) Refueling, maintenance and vehicle cleaning and related risks of soil and water contamination.

520. The construction sites carry certain safety risks for the population and, therefore, compliance with safety rules is important. Local traffic can be affected by transport activities related to the project. The mentioned impact is temporary, insignificant and manageable. A long-term impact on local traffic should be beneficial.

Mitigation Measures

521. These impacts can be reduced by a variety of measures, many of which are common in most urban construction. These includes:

(i) Require adherence to engine maintenance schedules and standards to reduce air pollution.
(ii) Use of defined, well planned haulage routes and reductions in vehicle speed where required;
(iii) Periodically water down temporary roads on site;
(iv) Cover trucks carrying cement gravel or other loose materials;
(v) Wet or cover trucks carrying stone/ sand/ gravel;
(vi) Haul materials to and from the site in off peak traffic hours.

522. The construction site should be watered as appropriate ensuring that watering is not enough to produce surface runoff. Personal protective equipment shall be provided to workers as necessary. All vehicles shall be checked and repaired in case of need to eliminate increased emission due to damaged parts.

I. Protection of the Soil and Erosion Prevention

1. Topsoil Protection

523. Top soil could be affected at the sites of road widening (slope cuts, infrastructure) and new alignments (new footprint). The major works are conducted within the existing footprint.

524. The topsoil shall not be handled by construction contractor when the following conditions are observed:

(i) The topsoil is frozen;
(ii) The site is experiencing persistent rainfall;
(iii) The topsoil is saturated; or
(iv) Handling will damage the structure of the topsoil.

2. Topsoil Storage

525. Topsoil will be stored in stockpiles, no more than 2m high with side slopes at a maximum angle of
525. The following shall also be taken into consideration:

(i) Dedicated storage locations will be used that prevent the stockpiles being compacted by vehicle movements or contaminated by other materials;
(ii) Topsoil will be segregated from subsoil stockpiles;
(iii) No material will be stored where there is a potential for flooding;
(iv) No storage at less than 25m from river/streams, subject to the site specific topography.

526. In the event that the stockpiles experience significant erosion the Contractor will be required to implement corrective action, such as installing erosion matting over the stockpiles if further surface compaction and/or topsoil seeding fails. The Contractor shall protect the stockpiles from flooding and run-off by placing berms or equivalent around the outside where necessary.

527. Topsoil stockpiles shall be monitored and should any adverse conditions are identified corrective actions to be taken shall include:

(i) Anaerobic conditions - turning the stockpile or creating ventilation holes through the stockpile;

(ii) Erosion - temporary protective silt fencing shall be erected

3. Subsoil Storage

528. For storing the subsoil in stockpiles, no more than 3m high with side slopes at a maximum angle of 600, the following shall be taken into consideration:

(i) Dedicated storage locations where the stockpiles shall not be compacted by vehicle movements
(ii) or contaminated by other materials; and
(iii) Segregation from topsoil stockpiles.

529. In the event that the subsoil stockpiles experience a significant erosion, Contractor shall take a corrective action such as installing erosion matting over the stockpiles

J. Impacts on Archaeological Sites.

530. Land clearance works, grading and excavations are associated with the risks of damaging underground archaeological remnants. Most expected archaeological sites are listed in the annex 3. However, not listed sites could be as sensitive as already known archaeological sites. The known sites have been identified just during major construction works, particularly during construction of the existing highway. The other sites have not been studied systematically. 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.

Mitigation Measures

531. Despite the fact that the 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. To avoid this risk, preliminary preventive studies and 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.

532. At the construction stage archaeological monitoring 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.
The preliminary scoping assessment has been conducted by the Institute of Archaeology and Ethnology of the Tbilisi State University. The scope of work and cost estimation for the required preliminary archaeological studies have been justified as 2000 lari**.**

K. Construction Related Impacts at the Asphalt Plant Sites

533. The asphalt will be provided to constructing contractor by the suppliers and, therefore, the asphalt plant related impacts are not direct impact of the project. However, the impacts of the asphalt plants (particularly emissions, waste disposal and pollution) should be considered as indirect impact of the project due to the increased production of asphalt by the existing plants.
Direct impacts of the asphalt plants (landscape degradation; emissions and dust; noise etc.) should be considered in case if the constructing company will decide to use its own mobile asphalt plants. In that case relevant EIA should be prepared and environmental Impact Permit should be obtained for installation and operation of the plant.

L. Mitigation Measures of Exploitation Phase

534. Erosion and ground stability control and landscape management. Road department of Georgia should facilitate control over erosive processes and ground stability as well as landscape restoration monitoring upon the completion of construction and introducing timely corrections. Corrections comprise but are not limited to rehabilitation-maintenance of drainage systems and implementation of anti-erosion measures (berms, restoration of relief and vegetation, etc), whereas necessary.

535. Road waste and pollution with fuel. Road department of Georgia should coordinate and organize the work of appropriate divisions (gas stations; waste management service, etc) and introduction of suitable tools.

536. Pollution of air with emissions, noise and pollution connected with rehabilitation work. Road department of Georgia should facilitate the implementation of those rules during rehabilitation work, which are described in the below management plan for construction works.

537. Prevention and mitigation of health risks and damage connected with spill of toxic substances due to emergency situations. Readiness for emergency situations. Road department of Georgia should participate and encourage the service of reaction to emergencies of the ministry of the internal affairs of Georgia in the development and introduction of the legislative acts necessary for the reaction action plans to similar emergency situations and their implementation as well as development of regulating legislation on transporting of hazardous material. System of measures should comprise the minimum of the following components:

(i) Development and introduction of safety measures and reaction plans in terms of damage prevention and mitigation as a result of spill of toxic substances;
(ii) Planning of special routes for hazardous substance transportation;
(iii) Introduction of strict control on the transporting of hazardous substances to reduce the danger;
(iv) Prohibition of transporting of toxic waste within sensitive areas.

538. The above measures should be planned according to Georgian legislation – law of Georgia “on Hazardous Chemical Substances” (1998).

539. Prevention of spreading of human, animal and plant diseases. The organization responsible for the control on the possible spread of human, animal and plant diseases during passenger and cargo transporting are the following: customs service, public legal entity “Inspection of Sanitary Supervision” and “National Service of Food Product Safety, Veterinary Service and Plant Protection” of the ministry of agriculture.

VI. ANALYSIS OF ALTERNATIVES

540. Non-implementation alternative was not discussed as socio-economic development of Svaneti region, namely, the utilization of its tourist potential, is impossible without the road rehabilitation.

541. The only realistic alternative could be proposed for the existing road section of 105 km-125 km. In substitution to the existing road section the alternative of moving the road to the left river bank was reviewed (figure 1). At the earlier stage the following became clear as a result of comparing of the alternatives.

542. The mentioned section (105 km-125 km) of the existing road is characterized by medium to high landslip threat:

(i) 109 km landslip – medium threat
(ii) 114 km landslip section (Mala Tvibra) – medium threat
(iii) 120 km village Becho – low threat

543. The mitigation of the landslip processes on the mentioned sections is possible through engineering measures.
On the alternative route only two landslip areas of medium threat occur.

(i) 6 km – at village Ghvebelda
(ii) 11 km – in the vicinity of village Magardeli.

544. However, some of the sections of the alternative route are characterized with mudflow and avalanche areas of the highest risk:

(i) 0.0 km – section of the highest mudflow and avalanche threat;
(ii) 3.5 km - section of the highest mudflow and avalanche threat;
(iii) 6.5 km - section of the highest mudflow and avalanche threat;
(iv) 8.5-9.0 km - section of the highest mudflow and avalanche threat.

545. Engineering control of the high energy mudflow and avalanche processes is possible at the above sections. The possibility of the development of hazardous gravitation events is high and results – catastrophic. Hence, the further discussion of the route alternative was found useless.

VII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Legislation and regulations of Georgia

546. In April 2000 Georgia ratified the Aarhus Convention. This UNECE convention facilitates and regulates information availability, involvement of the public in the decision making and law availability issues for the field of environmental protection. It secures implementation of the

principle that the involvement of all interested parties is necessary in order to achieve a steady development. The convention provides that the environmental protection shall be within the area of governmental accountability, transparency and responsibility. It is based on the premise that involvement of the public provides for the better projects creation, better development and governance.

547. The Georgian legislation on EIA and Environmental Permits requires consultations with the public only for those projects for which it is required that the Environmental Impact Assessment be developed.

548. Article 6 of the law of Environmental Impact Permit (2008) sets out detailed requirements and procedures for conducting public consultations and the timeframes for information disclosure and discussion, namely:

549. A developer is obliged to carry out public discussion of the EIA before it is submitted to an administrative body responsible for issuing a permit (in case of activity requiring a construction permit before initiating stage 2 procedure for construction permit issuance).

550. The project proponent/developer shall publish information on the planned activity before conducting a public review. The information shall be published in the central mass media, as well as in the newspapers in the administrative territorial office (if any) of the region, where the activity is planned.

551. The announcement shall contain the following information:

(i) The goal, title and place of the planned activity;
(ii) The location of the agency where interested and affected people will be able to familiarize themselves with the documents associated with the activity (including reports o environmental impact);
(iii) The deadline for submittal of suggestions;
(iv) The venue and time of the public review/meeting.

552. The project proponent shall:

(i) Provide a hard copy of IEE and its electronic version to the administrative agency that issues permission, in a week after the publication;
(ii) Accept and consider written notes and suggestions provided by citizens up to 45 days after the date of publishing the assessment;
(iii) Conduct a public review meeting of the planned activity no later than in 60 days after publication of the announcement;
(iv) Invite corresponding local self – administration and governmental agency representatives; the Ministry of the Environmental Protection, and the Ministry of Economical Development and other involved administrative agencies to the public review;

553. Reviews shall be open to the public and any citizen will be able to attend it. The public review shall be conducted in the region administrative center, where the activity is planned.

554. According to 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 as supplementary materials to the EIA to MoE or the administrative body responsible for issuing the Permit. The mentioned documents should be considered as an essential part of the EIA.

B. ADB Requirements

555. 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.

556. Consultation and Participation. ADB is committed to working with borrowers/clients to put meaningful consultation processes into practice. For policy application, meaningful consultation is a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues. ADB will require borrowers/clients to engage with communities, groups, or people affected by proposed projects, and with civil society through information disclosure, consultation, and informed participation in a manner commensurate with the risks to and impacts on affected communities. For projects with significant adverse environmental, involuntary resettlement, or Indigenous Peoples impacts, ADB project teams willparticipate in consultation activities to understand the concerns of affected people and ensure that such concerns are addressed in project design and safeguard plans.

557. In addition, ADB recognizes that Indigenous Peoples may be particularly vulnerable in certain project circumstances. Therefore, consent of affected Indigenous Peoples communities, through meaningful consultation, will be ascertained for the following project activities: (i) commercial development of the cultural resources and knowledge of Indigenous Peoples; (ii) physical relocation from traditional or customary lands; and (iii) commercial development of natural resources within customary lands under use that would impact the livelihoods or cultural, ceremonial, or spiritual uses that define the identity and community of Indigenous Peoples. For

the purposes of policy application, consent of affected Indigenous Peoples communities refers to a collective expression by the affected Indigenous Peoples communities, through individuals and/or their recognized representatives, of broad community support for such project activities. Broad community support may exist even if some individuals or groups object to the project activities. The borrower/client will ascertain whether the affected Indigenous Peoples communities provide their broad support to the project activities, and where such broad community support exists, the IPP will clearly document the consultation process. ADB will review the borrower's/client's documentation of the engagement process, and in addition, through its own investigation, will assure itself that broad community support for the project activities has been demonstrated by the affected Indigenous Peoples communities. ADB will not finance the project if such broad community support does not exist.

C. Public Consultation Scheme

558. In order to comply with the Georgian legislation and the ADB requirements and to ensure meaningful consultations, the following actions was ralesed:

D. Disclosure of documents

559. The electronic versions of the draft EIA was placed on the Mestia Municipality, MDF and orhuse centre web-sites.
Hard copies of Project environmental documentation (draft IEE and Executive Summary) was placed in:

(i) Mestia Municipality office;
(ii) MDF head office;
(iii) MoE Department of Licenses and Permits

E. Public Discussions

The Ministry of Regional Development and Infrastructure of Georgia
Road Department of Georgia
The minutes of the public discussion of the environmental impact assessment report of the reconstruction and rehabilitation works of the 75 km-139 km section of Zugdidi-Jvari-Mestia-Lasdili automobile road of state significance

560. The public discussion of the environmental impact assessment report of the reconstruction and rehabilitation works of the 75 km-139 km section of Zugdidi-Jvari-Mestia-Lasdili automobile road of state significance was conducted in the administration building of large village Mestia municipality on 4th March, 2010. The aim of the public discussion was the delivery of information to the local population within the direct impact area of the planned works about the above works and terms. The issues of the temporary discomfort to the population during the work process and planned mitigation measures to reduce undesirable events connected with the works were also discussed. During the management plan discussion the attendant public had the opportunity to inquire and critically remark on the plans for the consideration during the final planning.

Name, Surname	Organization Name
Davit Siradze	Employee of the road department
Otar Khatiashvili	Employee of the road department
Luiza Bubashvili	Employee of the road department

561. The public discussion was attended by the authorized representatives of the village territorial bodies of Mestia district and representatives of the population.

562. The environmental impact assessment report of the construction and rehabilitation works of the road of state significance was explained to the attendants by road department employee Otar Khatiashvili and environmental specialist Luiza Bubashvili.

563. The meeting was opened by Otar Khatiashvili, who informed the attendants of the state road construction within the municipality territory. The great significance of state road rehabilitation was discussed in terms of economic development of Georgia.

564. The environmental management plans were presented by Luiza Bubashvili. Project related works, their possible environmental impact and influence on human health were discussed along with mitigation measures, which facilitate minimization of any harmful impact in the phase of road construction and exploitation to acceptable level.

565. Technical issues of the project and related questions were addressed by Otar Khatiashvili.

566. The questions and comments of the participants were answered by the road department employees. Questions and answers are given in Table N13.

Deputy Chairman
G. Tsereteli
Employees of the road department of Georgia:
Davit Siradze
Otar Khatiashvili
Luiza Bubashvili.

Public consultation of the environmental impact assessment of the rehabilitation projects of the road of state significance

Question/comment author	Question/comment	Notes
Nora Jafaridze	What works shall be implemented in the residential areas, where road is narrowed?	In the residential areas, where existing road is narrowed by bearing walls or gabions, the road shall be widened up to project volume.
Gurgen Gvirgvliani	Does the project provide for the restoration of water pipes, if they are damaged during road rehabilitation?	If the pipes are damaged by rehabilitation work, their restoration shall be conducted within the project scope.
Murad Ushkhvani	Where will be the territory of construction waste allocation be located?	The area of construction waste allocation shall be agreed with local authorities.

567. The answers on the comments from the ministry of the protection of the environment and natural resources is given in the below table.

N	Questions and comments	Comment author	Comments of EIA Consultant
1.	The types and volume of explosive works, especially – in the proximity of residential areas should be more specific in EIA report	The ministry of the protection of the environment and natural resources	Drilling and explosive works will be conducted on the following sections: 101 km-110 km section of Zugdidi-Jvari-Mestia-Lasdili automobile road – rehabilitation works need preliminary disintegration of part of the rocky ground through drilling and explosions (31^a) in the total amount of 3805 m^3. 111 km-115 km section of Zugdidi-Jvari-Mestia-Lasdili automobile road – rehabilitation works need preliminary disintegration of part of the rocky ground through drilling and explosions (31^a) in the total amount of 10100 m^3. 114 km-115 km and 115 km-116 km sections of Zugdidi-Jvari-Mestia-Lasdili automobile road – rehabilitation works need preliminary disintegration of part of the rocky ground through drilling and explosions (31^a) in the total amount of 2200 m^3.
2.	Builders' camps and expected emissions should be described in more detail in EIA report	The ministry of the protection of the environment and natural resources	A camp is designed per lot, it will serve about 30 builders. At present the arrangement of equipment storage yards with 2 or 3 trailers and not full scale camps is planned for builder accommodation. There is no place or need to construct large building camp. The accommodation of builders will be facilitated in the nearby villages (see below list) as well as sanitary-hygienic facilities. Arrangement of sanitary-hygienic facilities is not planned in the camps. The workers will not live in trailers, which are determined for the storage of part of equipment and night shift of 1 safety employee. The yard will be used to store equipment and part of cars, fuelling the equipment and performance of easy maintenance. The equipped yards will probably be located at the villages: Dizi, Nodashi or lakhamula, Etseri, Latali and Mestia – presumably, workers will be accommodated and equipment yards arranged in these villages. The exact location will selected by construction contractors. The location shall be selected using the following criteria: - transformed urban or rural landscapes not sensitive in ecological terms; - fuelling equipment should be arranged 50 m or more away from surface water objects; - the camps should not be located

			closed than 350 m to the residential areas. The distance should be sufficient to reduce the noise impact to acceptable level and not very far, because the workers will be accommodated in the nearby villages during construction. The project does not provide for the dissipation stationary sources and consequently, there is no need for the preparation of normative documentation (i.e. MAI and MAD).
3.	EIA report should describe non-organic dust emissions in detail	The ministry of the protection of the environment and natural resources	**The emissions of non-organic dust is important for the construction phase, while during the exploitation the emission of harmful substances as a result of fuel consumption is significant (which is discussed in EIA).** **According to the request, additional attention will be focused on the issue of non-organic dust during the construction work.** At the same time we should note that the preparation of the report on the dissemination of harmful substances during the construction of roads is not internationally practiced (i.e. see EIA guidelines prepared by the World Bank for the road department of Georgia in 2007-2009). For the construction works the qualitative assessment of the construction equipment emissions (and not quantitative) and planning of protection measures (which do not depend on the precise amount). The assessment of the equipment emission is discussed in detail in EIA. The project does not provide for the dissipation stationary sources and consequently, there is no need for the preparation of normative documentation (i.e. MAI and MAD).
4.	Monthly values of direct and total radiation for horizontal and vertical surfaces of various orientations should be indicated in EIA report, for which residential areas and according to what they are given (p. 47, Appendix p. 164)	The ministry of the protection of the environment and natural resources	Climate description is given on the basis of Mestia hydro-meteorological station. The comment is taken into account and hence we indicate the sources of data, which is listed in Appendix 9. The following sources are mainly used for climate data: 1. Information Bulletin (2005): On the Ecological Conditions of Underground Hydro-Sphere and Study and Prognosis of Hazardous Geological Processes. “Sakgeologia”, Tbilisi, p. 410 2. Reference Book of Scientific-Applied

			Climate of Georgia; part one, individual climate characteristics, Tbilisi 2004m, p. 127 3. Sh. Javakhisvhili (1977), Climatography of Georgia, Tbilisi State University, p. 204 Climate data is reviewed in EIA in the volume sufficient to assess the project impact on the environment.
5.	EIA should identify which source is used for the climate data on wind, amount of clear and cloudy as well as misty days	The ministry of the protection of the environment and natural resources	On p. 47 of volume I and p. 164 of II volume (Appendices) of EIA the information could be found that climate characterization is given according to Mestia hydro-meteorological station data.
6.	Absolute minimal temperature is incorrectly indicated in EIA report. It is unclear to which period does -3 (presumably degrees) minimum temperature belong to (p. 47, Appendix p. 164)	The ministry of the protection of the environment and natural resources	As regards the absolute minimal temperature the indicated figure -3-5° is just a misspelling and should be -35°. P. 47 of volume I and p. 164 of volume II are changed accordingly. Average minimal temperature is indicated for winter period, value (-0,3°) is based upon the average of long term observations. The climate data was mainly obtained through the following sources: 1. Information Bulletin (2005): On the Ecological Conditions of Underground Hydro-Sphere and Study and Prognosis of Hazardous Geological Processes. “Sakgeologia”, Tbilisi, p. 410 2. Reference Book of Scientific-Applied Climate of Georgia; part one, individual climate characteristics, Tbilisi 2004m, p. 127 3. Sh. Javakhisvhili (1977), Climatography of Georgia, Tbilisi State University, p. 204 Climate data is reviewed in EIA in the volume sufficient to assess the project impact on the environment.
7.	Such necessary hydrological characteristics, such as annual maximum discharge of various recurrences for r. Enguri and its tributaries should be given in EIA report	The ministry of the protection of the environment and natural resources	Maximum discharge of various recurrences for r. Enguri is given in Appendix 1. The comment is taken into account and hydrological characteristics are added to the corrected EIA report (volume II, Appendix I, p. 190). The fact that the project does not imply building of new bridges should be noted. The repair of the existing bridges is limited to strictly rehabilitation work (restoration of cover, reinforcement of accesses, etc).
8.	The presented EIA report is	The ministry	Both in terms of quantitative and allocation

	general and needs more details in the following: • specific measures of management of waste formed during the construction; • categories of the waste by types and amount; • issues of waste characterization and management (allocation, processing, transportation, storage, distribution and securing) with due regard for risk-factors of environmental impact	of the protection of the environment and natural resources	problems of the waste during construction the only significant type of waste is formed from debris of rock stratum and ground debris increased by small amount of asphalt dissipated by cutter. Quantitative and allocation issues are described in EIA (total amount of debris is 260000 m^s). As regards the formation of solid household refuse, the amount is insignificant and depends on the number of staff in the building process. The number of workers in one shift is 30. There is one shift. The average annual amount of household waste per worker could be 70-80 kg. The collection of the waste on road construction section, allocation in waste containers and further transportation shall be conducted periodically through the utilities services which serve the villages located along the road. Insignificant amount of other types of waste (household or harmful refuse, such as oil or pieces polluted by fuel and filters) are not connected with the rehabilitation project and hence the project does not require precise quantitative analysis. Planning of adequate procedures of waste management is enough, which is reviewed in EIA (p. 73).
9.	The representatives of the wild life of Georgia included in Georgian Red List and presumably distributed in the right of way are listed in EIA report. Possible negative impact on each species should be studied and if necessary appropriate mitigation measures introduced. With due regard to the results of these studies the plans of environmental monitoring, mitigation measures, reaction to emergencies, compensation measures, which should be reflected in EIA presented for ecological expertise	The ministry of the protection of the environment and natural resources	It should be taken into account that project does not imply new road construction, but reconstruction of the existing road. Impact on new habitat or damage to intact landscapes is not expected. The project is not connected with habitat fragmentation or degradation risks and disruption of animal migration routes. The level of ecological studies, which is needed for the EIA format, is completed and adequate mitigation measures named. Mitigation measures comprise pre-construction survey, which implies reconnaissance of the construction corridor and if bird nests and small animal living areas are discovered, preventive measures should be implemented during the mobilization phase (forcing of movement to new living area via soft methods and clearing of the corridor). The above measures are listed despite the fact that the actual possibility of the necessity to implement such measures is really low – rehabilitation works are conducted within the existing road and widening is planned through cutting into rocky slopes.
10.	The plants included in Red List of Georgia could occur along the adjacent areas to automobile road and they could be eliminated.	The ministry of the protection of the	It should be taken into account that project does not imply new road construction, but reconstruction of the existing road. The road widening on the narrow sections is planned

	Surveys should be conducted prior to the commencement of the construction and species of plants included in Georgian Red List identified along with number of individuals to be cut. Further activities should be conducted in accordance with the laws of Georgia on Red List and Red Book	environment and natural resources	through cutting into rocky slopes. Any significant impact on new habitats or damage to intact landscapes is not expected. The level of ecological studies, which is needed for the EIA format, is completed and adequate mitigation measures named. Wood cutting is not required in intact landscape by the project. Despite the above (if cutting of individual trees is necessary), the procedure to be implemented prior to commencement of the construction and involving cadastre inventory of the trees to be cut and agreement of the cutting plan with the forestry department of the ministry of protection of the environment and natural resources is given. Mitigation measures comprise pre-construction survey, which implies reconnaissance of the construction corridor during the mobilization phase. If the individuals of protected plants are discovered on the areas which could be under the impact of the construction (i.e. allocation areas of builders' camps, which will be eventually selected by the contractor).
11.	Working project of river crossing by the automobile road should be agreed upon with the national environmental agency of the ministry of the protection of the environment and natural resources prior to presenting for ecological expertise	The ministry of the protection of the environment and natural resources	The project does not involve construction of any bridges. The rehabilitation of the 7 bridges is limited to the restoration of the road surface and other simple rehabilitation works.
12.	The EIA report should be supplemented with the coordinates of the mentioned road section or digital version in Shp file format	The ministry of the protection of the environment and natural resources	The EIA report is supplemented with the plan and topographic map. The technical project comprises appropriate topographic measuring (in Autocad files). There is no provision in Georgia legislation making submission of Shp files mandatory.

VIII. GRIEVANCE REDRESS MECHANISM

568. PIU (MDF in this particular case) has overall responsibility for project implementation and environmental compliance. The administrative bodies responsible for environmental protection are the Ministry of Environmental Protection and Natural Resources and the City Hall. The affected population and stakeholders may send their grievances, related to the project induced environmental impacts and nuisance to PIU or directly to the administrative bodies responsible for the environmental protection

569. The MoE and city hall are obliged to respond to the grievances, which have been received from the population or other interested parties in accordance with the requirements of the Administrative Code of Georgia

570. However, the PIU will facilitate the response through implementing the following grievance redress mechanism. During the public consultation process, the PIU will inform the stakeholders and the public that PIU is responsible for environmental compliance and grievance redress. PIU will provide information on the public consultation meetings and post on the MDF web-site the contact details of the persons responsible for grievance collection and response. Upon receiving the grievance (in written or oral form) the PIU will carry out the following actions:

(i) send its representatives to check the claims and monitor the situation
(ii) involve MoE and City Hall when and where appropriate
(iii) receive expert's conclusion (from MDF personnel, independent experts or MoE/City Hall experts)
(iv) submit an instruction on corrective measures to the construction company and the operator
(v) during 10 days after receiving the grievance inform the affected person or persons about the experts' decision and corrective measures applied;
(vi) If the affected person is not satisfied by the decision, they may present further information in support of new case. The subsequent decision of the PIU/MOE and Municipality is considered finally.

571. In case the affected stakeholder or person is not satisfied with the response, the grievance may be the directed to the court.

A. Environmental Management Plan

1. Institutional Framework for EMP Implementation

572. Construction Contractor shall be obligated by his contract to follow EMP and good construction practice. In order to meet this obligation, the Contractor shall have at least one environmental specialist in the team, who is able to fully understand the requirements of the EMP and professionally apply the envisaged mitigation measures to the contractor's daily operations. The construction contractor will also be required to prepare and implement his own Construction Phase EMP explaining in detail the action he will take to provide the mitigation set out in this IEE that is his responsibility.

573. The technical supervisor of works commissioned by MDF shall be responsible for establishing a strong field presence in the Project area and keep a close eye on the performance of works. Besides ensuring consistency with the design and ensuring quality of works, the supervisor is required to track implementation of the 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.

574. 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 ADB, ensures availability of all environmental information, and facilitates environmental supervision of the Project by ADB.

2. Reporting on EMP Implementation

575. The Contractor, will be required by the construction consultant to prepare monthly progress reports on the EMP implementation. Such reports shall be prepared by the Contractors environmental specialist and will contain information on the main types of activities carried out during the reporting period, status of any clearances/permits/licenses which are

required for carrying out such activities, mitigation measures applied, and any environmental issues that have emerged in relations with suppliers, local authorities, affected communities, etc. Contractor's monthly progress reports shall be submitted to the technical supervisor and MDF.

576. The technical supervisor shall prepare monthly reports on the progress of EMP implementation and environmental performance of the contractor. These reports shall be based on the contractor's reports and will carry analysis of their contents. The technical supervisor shall assess how accurate is the factual information provided in the contractor's reports, fill in any gaps identified therein, and evaluate the adequacy of mitigation measures applied by the contractor. The technical supervisor shall highlight any cases of incompliance with EMPs, inform on any acute issues brought up by the contractor or revealed by supervisor himself, and propose corrective actions. Once approved by MDF the Technical Supervisor will instruct the contractor to implement the corrective action.

577. MDF shall ensure that monthly reports from the contractor and from the technical supervisor are made available for the environmental specialists of the Fund promptly after they are received by the MDF administration. The Fund, through its environmental specialists, shall report to ADB on the status of environmental compliance of construction works each quarter. Such reports shall contain information on all violations identified and the actions taken to correct them. MDF shall inform the ADB on any major environmental issue at any time, independently from the schedule of regular reporting.

3. Monitoring

578. The monitoring plan for the project is summarized **in p.10.1** Monitoring measures include construction site supervision, verification of permits, monitoring of compliance of the contractor performance and specific monitoring of environmental impacts like: noise, dust, soil and water pollution and air emissions etc.

579. The technical supervisor 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.

4. Budget for implementation of EMP

580. Most of the mitigation requires action by the contractor, which will be taken as part of the normal construction activities, the costs of which are estimated elsewhere. There are in fact very few other mitigation actions that need to be budgeted separately. Those that do require separate budgeting provision are:

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

582. 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.

583. The Archaeological studies should be conducted by contractor via engaging appropriate organization. Estimated costs for these studies equal **3 000 GEL.** These expenses should be considered in the Construction contract.

584. Costs of spoil and rock disposal approximately is 600 000 – 800 000 GEL.

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

5. Remedies for EMP Violation

586. MDF as PIU and administration of the Region, as a client of construction works, shall be responsible for enforcing compliance of the 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, another contractor shall be tasked to do the restoration, and the cost shall be deducted from the failed contractor's next payment.

Environmental impact at the Construction Phase					
Impacts	**Sites**	**Mitigation Measures**	**Costs**	**Responsibility for Implementation**	**Responsibility for Monitoring and Enforcement**
Erosion from road cuts and fills and sedimentation of natural drainage ways. **Nature of impact**: long-term. Change of relief, drainage patterns, land clearance, may cause gradual but stabile intensification of erosion	Construction site RoW	Installation of long-term drainage systems and anti-erosion structures. • reinstatement of relief, soil and vegetation cover • Installation of long-term drainage system and permanent monitoring. • Installation of sedimentation basins, seeding or planting of erodible surfaces as soon as possible • Increase the number of drain outlets. • Place drain outlets so as to avoid cascade effect. • Line receiving surface with stones, concrete. • Long-term monitoring and maintenance	Insignificant	Construction Contractor	Construction Contractor MDF.
Erosion stimulated from fresh road cuts and fills and temporary sedimentation of natural drainage ways. **Nature of impact: immediate**; Fresh road cuts may immediately trigger intensive erosion during construction and drastic increase of sedimentation	Construction site RoW	**Mitigation strategy**: prevention through implementing temporary anti-erosion measures – temporary drainage, biomatting or geo-textile cover, berms etc. • 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	Insignificant	Constructing contractor	Constructing contractor MDF.

		basins			
Erosion of lands below the road bed receiving concentrated outflow from covered or open drains	Construction site	• Increase the number of drain outlets. • Place drain outlets to avoid cascade effect. • Line receiving surface with stones, concrete.	Insignificant	Constructing contractor	Constructing contractor MDF.
Topsoil losses due to improper storage and handling	Construction site	**Topsoil Protection** The topsoil will not be handled by Contractor when the following conditions are observed: • The topsoil is frozen; • The site is experiencing persistent rainfall; • The topsoil is saturated; or • Handling will damage the structure of the topsoil. • Keep topsoil storage standards	Insignificant	Constructing contractor	Constructing contractor MDF.
Increased suspended sediment in streams affected by erosion at construction sites and fresh road cuts, fills and waste dumps. Declined water quality and increased sedimentation **Character of impact**: immediate; Fresh road cuts may immediately trigger intensive erosion during construction and drastic increase	Construction site	**Mitigation strategy**: prevention through implementing temporary anti-erosion measures – temporary drainage, temporary sediment catchments etc. • Protect susceptible surfaces with r fabric, • Establishment of retention ponds to reduce sediment loads before water enters streams	Insignificant	Constructing contractor	Constructing contractor MDF.

of sedimentation					
Soil and water contamination during construction by oil, grease, fuel and paint	Construction site	• Collect and recycle lubricants. Store the lubricants and fuel residue in special room. Use impermeable tray for placing lubricant containers. • Avoid accidental spills through good practice. • Avoid refueling near watercourses; Ensure proper maintenance of equipment and fueling of the vehicles and machinery. • Check vehicles (leaking of fuel etc.) • Organize and cover material storage areas; • Isolate concrete, earthwork and other works from water courses by using sealed formwork; • Isolate wash down areas of cement and gravel trucks and other equipment from water courses by selecting areas for washing that are not free draining directly or indirectly into water courses;	Insignificant	Constructing contractor	Constructing contractor MDF.
Poor sanitation and solid waste disposal in construction camp and work sites (sewerage, sanitation, waste management) .	Construction site	Provide adequately located and maintained waste disposal facilities (containers). Contract municipal waste operators for disposing the household waste, garbage and small amounts of nonhazardous construction waste etc. .	Insignificant	Constructing contractor	Constructing contractor MDF.

Construction wastes. Disposal of excess soil and rock. Certain part of the cut material (soil and rocks) should be disposed of Demolition of old pavement	Construction site Asphalt and rocks demolition area; Landfill	Assess and, if required, develop a spoil and rock disposal plan Provide for disposal facilities agreed with Regional Services of MoE Transport any further material to the nearest spoil disposal sites agreed with the regional services of MoE and/or municipal services. The main purpose is not to damage valuable landscapes or soil deposits and other ecological sensitivities. For the rock disposal licensed landfill can be used. All waste from the construction site will be disposed of in accordance with the local environmental regulations and on the sites approved by the environmental authority. The demolished asphalt and rocks should be reused.	Significant 700 000 Lari	Constructing contractor	Constructing contractor MDF. MoE
Noise pollution from vehicle operation during construction in the populated areas traversed by the highway, Local noise.	Construction site	Install and maintain mufflers on equipment. Routine maintenance shall be done to a high standard to ensure that vehicles are safe and that emissions and noise are minimized. All the plants used on site will be regularly maintained so as to be in good working order at all times to minimize noise. Prohibit night works near the settlements	Insignificant	Constructing contractor	Constructing contractor MDF.
Air pollution from vehicle operations during construction in the populated areas	Construction site Access roads	• Require adherence to engine maintenance schedules and standards	Insignificant	Constructing contractor	Constructing contractor MDF.

traversed by the highway, Local dust		(or use alternative fuels) to reduce air pollution. • Periodically water down or lightly oil temporary roads. • Enhance public transportation and traffic management capability. Cover trucks carrying cement and/or gravel; Wet or cover trucks carrying stone/ sand/ gravel; Haul materials in off peak traffic hours.			
Infrastructure. The main infrastructure element that could be affected are the power transmission lines, water supply systems and irrigation pipes and channels..	Construction site	**Protection of infrastructure.** Replace the affected infrastructure elements Permanent monitoring during construction. Full reinstatement in case of damage	Including in project budget	Constructing contractor	Constructing contractor MDF.
Construction Camp Site The potential impacts related to the construction and operation of the camp can be summarized as follows: • Clearance of vegetation cover during camp construction • Potential damage of topsoil • Contamination related to fuel storage and fuelling operations	Construction site	• Proper waste management. • Pollution prevention strategies: proper organization of fueling, waste management; • Proper storage of topsoil	Insignificant	Constructing contractor	Constructing contractor MDF.

• Sewerage related contamination • Waste management					
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.	Construction site	Remove all created pools till spring-time. Reinstate relief and landscape.	Insignificant	Constructing contractor	Constructing contractor MDF.
Health hazards by noise, air emissions and dust raised and blown by vehicles during construction activities.	Construction site; Access roads	Dust control by application of watering. Use as minimum as 2 browsers; Noise control, installation of mufflers on equipment, daytime works;	Insignificant	Constructing contractor	Constructing contractor MDF.
Impacts on archaeological sites and remnants	Construction site	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	Insignificant	Constructing contractor	CAS represents Constructing contractor MDF.
biological recontamination during earthworks near pest-holes of soil	Construction site	Permanent monitoring during land clearance and excavation activities. Stoppage and suspension of construction	Insignificant	Constructing contractor	Veterinary Department of the NSFSVPP Constructing contractor

infections (e.g. anthrax);		activities in case of burial site findings. Notification to the local division of Veterinary Department. Veterinary clearance before start up.			MDF.
Hazardous driving conditions where construction interferes with pre-existingroads	Construction site	Include in the design for proper markings and safety signs on roads, including lights. Instruct the drivers	Insignificant	Constructing contractor	Constructing contractor MDF.

I.2 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**
Whole construction period.	Dust and Air pollution (solid particles, suspended solids, flying heavy metal particles)	Construction site; Access roads; Cut asphalt and rocks crushing area. Blasting Works	Supervision	*Unannounced inspections; following complaints*	*Assure compliance with HSE requirements.*	*Minimal Included in supervision contracts*	Constructing Contractor MDF
Whole construction period.	*Vibration and Noise*	*Construction site;* Access roads Blasting Works Cut asphalt and rocks crushing area.	*Supervision*	*Unannounced inspections; following complaints*	*Assure compliance with HSE requirements.*	*Minimal Included in supervision contracts*	*Constructing Contractor* *MDF*
Whole construction period.	*Topsoil and subsoil management*	*Construction site,* Rite of way	Observation	Once per week	Assure compliance	Minimal Included in supervision contracts	Constructing Contractor; MDF
Whole construction	Traffic safety/ Vehicle/	Construction site, Access roads	Observation	Once per week	Assure compliance	Minimal Included in	Constructing Contractor;

period.	pedestrian access Visibility/ appropriate signs	Rite of way				supervision contracts	MDF
Whole construction period.	Material and waste storage, handling, use Water and soil quality (suspended solids, oils, etc)	Construction site; Rite of way Material and waste storage sites;	Observation	During material delivery and periodically during construction (average 1/week), especially during precipitation (rain/ snow/ etc).	Assure pollution abatement; Assure compliance with, construction standards, environmental norms and EMP provisions;	Minimal Included in supervision contracts	Constructing Contractor; MDF;
Whole construction period.	Waste Management (Transportation and disposal)	Construction sites; Access Roads; Waste disposal areas.	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
Whole construction period.	Equipment maintenance and fuelling	Refueling and equipment maintenance facilities;	Observation	average 1/week,	Assure pollution abatement	Minimal Included in supervision contracts	Constructing Contractor; MDF
Whole construction period.	Impacts on archaeological sites and remnants	Construction site	Observation	Permanent/daily	Assure cultural heritage protection	Minimal	CAS represents. Constructing Contractor; MDF
Whole construction period.	biological recontamination during earthworks near pest-holes of soil infections (e.g. anthrax);	earthwork site	Observation	Permanent/daily	Assure health protection	Minimal Included in supervision contracts	Construction Field officer; Veterinary Department of the NSFSVPP
Whole construction period.	Protection of infrastructure elements	Construction site; Crossings of current infrastructure;	Observation	During construction activities at the site	Assure infrastructure protection and replasement	Minimal Included in supervision contracts	Constructing Contractor MDF
During Construction	Reforestation. Eco-	Recreation site	Observation	During Construction	Assure offset of cut forests	Minimal Included in	Constructing Contractor;

period	compensation Program			period		supervision contracts	MDF
During Construction period	Disposal of construction wastes (Inert Waste)	work sites, used areas, Landfill	Observation	During Construction period	Ensure pollution prevention and landscape protection;	Minimal Included in supervision contracts	Constructing Contractor; MDF
Whole construction period.	Personal Protective equipment. HSE issues	Construction site Access roads	Inspection	Unannounced inspections during works	Assure compliance with HSE requirements	Minimal Included in supervision contracts	Constructing Contractor; MDF

J. Conclusion and Recommendation

The presented IEE document clearly shows that there would be positive as well as negative impacts on environment during construction and regular operation phases. The document describes mitigation measures for all negative impacts on environment together with related expenses that includes implementation of the mitigation measures as well as monitoring costs;

1. One of the most positive results of the project implementation is the restored and widened Zugdidi-Jvari-Mestia-Lasdili road. The rehabilitation works will become significant factor for Zemo Svaneti region in local socio-economic and development of tourism;
2. Negative impact during the construction phase will be formed due to increase of the level of noise, dust and vibration, although it is noteworthy that the same impact is typical to any construction project and hence a wide array of mitigation measures have been elaborated and checked for effectiveness;
3. The level of noise, dust and vibration resulting from the movement of equipment will be significantly decreased upon the completion of the construction;
4. Large amount, approximately 260 000 m^3 inert waste will be formed due to rock cutting for road widening process during the project implementation. The inert waste should be used (distributed to the population, arrangement of reinforcement of the sensitive areas in agreement with government organizations as well as trench filling, etc). The allocation of inert material is the last way of waste management;
5. The normal functioning of the road is especially complicated by landslips developed in the tectonically unstable slate strata with deformation depths within several dozens of meters and their formation-activation occurs through integration of various factors. Complete stabilization of these landslips via engineering construction is impossible. A range of effective measures recommended during the characterization of these landslips are the most reasonable to retain their dynamic balance.

6. Despite some negative impact, which require permanent monitoring and precise implementation of mitigation measures, the benefit from the project greatly exceeds the negative impact.

Literature

1. M. Kordzaia ”Klimate of Georgia” Tbilisi. 1961. 245p. .
2. S. Gavakhishvili ”Description of Klimate of Georgia by Month” Tbilisi. 1988. 155 p.
3. Canter L.W. 1996. Environmental impact assessment. 2nd ed. McGraw-Hill. New York, London, Tokyo, Toronto.
4. Convention on Biological Diversity. 1995. UNEP. Switzerland.

5. Council of Europe. Convention on the conservation of European wildlife and natural habitats. Bern, 19.09.1979.

6. Forest Code of Georgia. 2000. Tbilisi.

7. Groombridge B. (ed.). 1992. Global biodiversity: Status of the Earth's Living Resources. Chapman & Hall, London, 47-52.
8. Harcharik D.A. 1997. The future of world forestry. Unasylva 190/191, 48, 4-8.
9. Isik K., Yaltirik F., Akesen A. 1997. The interrelationship of forests, biological diversity and the maintenance of natural resources. Unasylva 190/191, 48, 19-29.
10. Karagöz Gursel. 2001. Introductory country reports. Turkey. In: Borelli S., Kremer A.,
11. Geburek T., Paule L., Lipman E. (compilers). Report of the Third EUFORGEN Meeting on Social Broadleaves, 22-24 June 2000, Borovets, Bulgaria. International Plant Genetic Resources Institute, Rome, Italy, 11-22.

12. Kikodze D., Kvachakidze R., Nakhutsrishvili G. 1997. Georgian botanical diversity. Flora. In:

13. Georgian Biodiversity Country Study Report. UNEP, NACRES, Ministry of Environment of Georgia. Tbilisi, 34-45.
14. Lanly J.-P. 1997. World forest resources: situation and prospects. Unasylva 190/191, 48, 9-18.
15. Morris P. 1995. Ecology overview. EIA. 197-225.
16. Morris P., Thurling D., Shreeve T. 1995. Terrestrial ecology. EIA, 227-241.
17. Nakhutsrishvili G. 1999. The Vegetation of Georgia. Braun-Blanquetia, 15, 1-74.
18. Nakhutsrishvili G. 2000. Georgia's basic biomes. Biological and Landscape Diversity of Georgia. WWF, BMZ, Tbilisi, 43-68.
19. Northen H.T. 1968. Introductory plant science. Third ed. The Ronald Press Company, New York.
20. Raven P.H., Evert R.F., Eichhorn S.E. 1986. Biology of plants. Worth Publ., New York.
21. Sakhokia M.F. 1961 (ed.). Botanical excursions over Georgia. Tbilisi.
22. The 2000 IUCN red list of threatened species. 2000 UNEP, WCMC.
23. N. Astakhov "Structure Geomorphology of Georgia" "Metcniereba" Tbilisi 220 p.
24. Geomorphology of Georgia (1971) "Metcniereba" Tbilisi 515 p.

R. Khazaradze – Svaneti "Geog

Activity/Factor	Impact	Direct	Indirect	Positive	Negative	Reversible	Irreversible	Temporary	Mitigable	Residual
Physical existence of linear installation	Shallow groundwater and drainage patterns	+			+		+		+	
	Aquatic area									
	Emissions									
	Noise, vibration									
	Ground pollution and/or waste generation									
	Ground and surface water pollution									
Transport Movement	Destruction of natural landscape, habitats, erosion									
	Aquatic area									
	Emissions	+			+				+	+
	Noise, vibration	+			+				+	+
	Ground pollution and/or waste generation		+		+	+		+		
	Ground and surface water pollution		+		+	+		+		
Repairing/Restoration activities	Destruction of natural landscape, habitats, erosion	+			+	+		+	+	
	Aquatic area	+			+	+		+	+	
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution	+			+	+		+	+	
Traffice Incidents	Destruction of natural landscape, habitats, erosion								+	
	Aquatic area	+			+	+		+	+	
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution	+			+	+		+	+	

Exploitation Phase

N	(Impact Related to the Physical Presence and exploitation of Highway)	Yes/No Significance	Sections
20	Long-term degradation of the natural landscapes (relief, soil, vegetation, environment and wildlife), modification of landscape in the right of way	Yes Insignificant Rehabilitation of the existing road	Entire length
21	Long-term degradation of the natural landscape (relief, soil, vegetation, environment and wildlife), modification or elimination of landscape at the access roads, pits, strata embankments, construction areas and equipment yards	Yes Insignificant Maybe significant	Pit areas Embankment areas
22	Landslips, landslides and dangerous gravitational processes after the completion of construction: processes could be triggered by road construction related change of landscape or other landslip causes, which are connected with the project (deforestation, vegetation removal from slopes, change of hydrographic configuration, changes to terrain and soil density, etc)	Yes	Landslip areasL km 109; 114; 115-116; For details – geohazard map,
23	Activation of erosive processes in the highway corridor and adjacent territories: processes could be triggered by road construction related change of landscape or other landslip causes, which are connected with the project (deforestation, vegetation removal from slopes, change of hydrographic configuration, changes to terrain and soil density, etc) Erosion under the road surface due to concentrated directing of water through open or closed drainage channels Temporary filling of drainage ways with sediments	Yes Moderate	Entire length
24	Landscape scarring with dams, unaesthetic engineering constructions, ground excavation and degradation of vegetation. Remaining earthfills and unmaintained pits. Damaged landscape (not restored construction areas, landscape degraded due to landslips and erosion caused by construction)	Yes Moderate	Entire length of corridor
25	Alteration of hydrological regime of those rivers and streams, which cross the highway due to bridges, gabions, bank retaining and other hydrotechnical constructions. Impact of this alteration on adjacent areas and infrastructure, arable land and	No	No

	ecosystems		
26	Alteration of surface and ground drainage systems (due to earth works, excavation of deep trenches and changes of terrain)	Yes Positive	Restoration of drainage systems in disrepair
27	Increase of sediments in streams, rivulets and rivers due to erosion activated by road construction. Deterioration o water quality and increase of sediments	Yes Insignificant	R. Enguri
28	Soil and water pollution with oil, lubricants, fuel and paint along the highway (due to intensification of auto traffic)	Yes Insignificant	Entire length R. Enguri
29	Ground and surface water pollution with herbicides against the vegetation or chemicals against dust (i.e. Calcium Chloride)	No	No
30	Air pollution during maintenance repair by construction equipment	Yes Insignificant	Entire length
31	Increase of air pollution due to intensification of auto traffic (dust, emission of harmful substances)	Yes Moderate	Entire length; Villages: Etseri, Matskhvarashi, Latali, Kashveti and large village Mestia
32	Increase of car noise due to intensification of auto traffic (especially in residential areas, which are crossed by the highway, in the zone of district centers and densely populated villages)	Yes Moderate	Villages located in the areas adjacent to the highway
33	Increased amount of waste along the highway	Yes Moderate	Entire length
34	Creation of new routes of human and animal diseases (infection vectors)	Yes Moderate	Entire length
35	Creation of new routes of diseases, parasites, weeds and other harmful organisms	Yes Moderate	Entire length
36	Threat to population health due to air pollution (emissions, dust) and noise connected with the intensified traffic	Yes Moderate	Villages located in the areas adjacent to the highway
37	Dislocation and forced displacement of the individuals living in the right of way (in towns and rich farming regions it could involve large numbers)	No	No
38	Moving of routes from houses to farms, etc, which increases the travel time	No	No
39	Hampering of the non-motor vehicle due to reduction or impediments within the right of way	No	No
40	Induced development, uncontrolled construction of commercial, industrial, residential infrastructure and adjacent areas along the road	No	No
41	Planned development and other illicit invasion on the land of local population, which causes serious	No	No

	social and economic explosion		
N	**Impact of Emergency Situations of Exploitation Phase**	**Yes/No Significance**	**Sections**
42	Risk of casualties connected with cars and other transport, which could result in spilling of toxic substances	Yes Insignificant	Villages: Etseri, Matskhvarashi, Latali, Kashveti and large village Mestia