

# Initial Environmental Examination

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February 2017

## GEO: Secondary Road Improvement Project

### Feasibility Study and Preliminary Design for “Dzirula–Kharagauli–Moliti–Pona–Chumateleti” Km 0.0–Km 50.0 Road Section

Prepared by Kocks Consult GmbH, Germany for the Asian Development Bank. This is a revised version of the draft originally posted in August 2016 available on <https://www.adb.org/projects/documents/geo-srip-dzirula-kharagauli-moliti-pona-chumateleti-aug-2016-iee>

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To: Ari J. Kalliokoski  
Transport and Communications Division  
Central and West Asia Department

Dear Ari,

Referring to your letter dated 17 February, 2017 we would like to inform you that the revised IEE for Secondary Road Improvement Project was endorsed (See link below). Please, be informed that Georgian version will be also published in a nearest future appropriate.

[http://www.georoad.ge/uploads/files/Linked-9-IEE-for-GEO-Secondary-Road-Improvement-Project\\_Final\\_17Feb2017\\_Track\\_Change.pdf](http://www.georoad.ge/uploads/files/Linked-9-IEE-for-GEO-Secondary-Road-Improvement-Project_Final_17Feb2017_Track_Change.pdf)

With best regards,

Zaza Simonia

Acting Deputy Chairman of RD

## ABBREVIATIONS

ABI	–	Actual Biodiversity Index
ADB	–	Asian Development Bank
AIDS	–	Acquired Immune Deficiency Syndrome
BDI	–	Biodiversity Index
BKNP	–	Borjomi-Kharagauli National Park
BOD	–	Biochemical Oxygen Demand
CITES	–	Convention on International Trade in Endangered Species
CO	–	Carbon Monoxide
COD	–	Chemical Oxygen Demand
CSC	–	Construction Supervision Consultant
DPAW	–	Department of Protected Areas and Wildlife
DO	–	Dissolved oxygen
dBA	–	A-weighted decibels
EA	–	Executing Agency
EHS	–	Environment, Health and Safety
EIA	–	Environmental Impact Assessment
EIP	–	Environmental Impact Permit
EMP	–	Environmental Management Plan
EMoP	–	Environmental Monitoring Plan
GAP	–	Gender Action Plan
GIS	–	Geographical Information System
GDP	–	Gross Domestic Product
GRM	–	Grievance Redress Mechanism
h, hr	–	Hour
ha	–	Hectare
HIV	–	Human Immunodeficiency Virus
IA	–	Implementing Agency
IEE	–	Initial Environmental Examination
IES	–	International Environmental Specialist
IFC	–	International Finance Cooperation
IUCN	–	International Union for Conservation of Nature
Kg	–	Kilogram
Km	–	Kilometer
kpa	–	Kilopascal
LARP	–	Land Acquisition Resettlement Plan
Ls	–	Lump Sum
M <sup>2</sup>	–	Square Meter
M <sup>3</sup>	–	Cubic Meter
MAC	–	Maximum Allowable Concentration

Max.	–	Maximum
MESD	–	Ministry of Economic and Sustainable Department
Min.	–	Minimum
MoENRP	–	Ministry of Environment and Natural Resources Protection
MRDI	–	Ministry of Regional Development and Infrastructure
No.	–	Number
NES	–	National Environmental Specialist
NO <sub>2</sub>	–	Nitrogen Dioxide
O <sub>3</sub>	–	Ozone
PIU	–	Project Implementing Unit
PPMS	–	Project Performance Management System
PPTA	–	Project Preparatory Technical Assistance
RD	–	Roads Department
RoW	–	Right of Way
SEE	–	State Ecological Expertise
SO <sub>2</sub>	–	Sulfur Dioxide
SPS	–	Safeguard Policy Statement
SSEMP	–	Site Specific Environmental Management Plan
ToR	–	Terms of Reference
TPH	–	Petroleum Hydrocarbon
TSP	–	Total Suspended Particulates
TSS	–	Total Suspended Solids
TMP	–	Traffic Management Plan
UNFCCC	–	United Nations Framework Convention on Climate Change
VOC	–	Vehicle Operating Costs
WB		World Bank
WTO	–	World Trade Organization

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## **A. Executive Summary**

### **Introduction**

1. The Government of Georgia is seeking financial assistance from the Asian Development Bank for the Secondary Road Improvement Project. ADB has contracted a Consultant (Kocks Consult GmbH) to undertake a Feasibility Study and Preliminary Design of the Dzirula-Kharagauli-Moliti-Pona-Chumateleti Section Road. Included in this consultancy scope is to perform an Initial Environmental Examination (IEE), a requirement for environment Category B project classified under the ADB's Safeguard Policy Statement (SPS) 2009.

2. The purpose of this IEE is to assess potential environmental, health, safety and social impacts of the proposed road project. With the expected construction scope, no significant adverse and irreversible environmental impacts had been noted in the environmental assessment process. This IEE document includes an Environmental Management Plan (EMP) based on the identified potential impacts, their characteristics, magnitude, distribution, and duration, sensitive receptors and affected groups with corresponding mitigation measures designed to minimize, reduce and mitigate (or compensate the affected parties), to be implemented for the entire project cycle.

3. The IEE study was conducted based on secondary information from a number of available sources, while primary data were obtained from field parametric measurements along with the observations gathered from several field visits. Environmental public consultations were done in Kharagauli, Moliti and Chumateleti and were attended by residents of the communities mentioned as well as those from surrounding villages.

### **Policy, Legal, and Administrative Framework**

4. The IEE study was in conformance with the national legal framework of Georgia consisting of the important laws in environmental protection, water protection, cultural heritage, public health, and other national environmental legislations. In addition, International Treaties that Georgia was a signatory were also considered as part of the overall framework.

5. In Georgia, for project of considerable magnitude, an Environmental Impact Permit will have to be issued for the project by the Service of Permits under the Ministry of Environment and Natural Resources Protection (MoENRP) of Georgia. An important step of the Permit is an Environmental Impact Assessment<sup>1</sup> in the local parlance, the output of which shall be compiled a report and shall be assessed by the State Ecological Expertise. A positive conclusion will be the basis for the Ministry to issue a Permit within 20 days from the registration of the application.

6. Under ADB approval requirements, a set of specific safeguard requirements are required to be met by the Borrowing Country in addressing environmental and social impacts and risks. The project would undergo Screening and Categorization, formulation of Environmental Management Plan and Public Disclosure. Public Consultations for Category B would be required so that views of affected groups are taken into account in the design of the Program and within the mitigation measures proposed.

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<sup>1</sup> Contrary to ADB's SPS 2009, in Georgia, there is no categorization of projects; hence all impact assessment for any project is referred to as Environmental Impact Assessment.

## Description of the Project

7. The project road is a 50.404-km west to east secondary road, starting from E60 in Dzirula and ending at E60 junction at Chumateleti. Most of the project road is within Imereti Region with a few kilometers within Shida Kartli Region, through a gorge with mountain ranges with on both the northern and southern part. It is envisioned that this road, when improved, will enhance connectivity to a number of towns and villages at the foothills of the mountain ranges and can act as alternate route to parallel segments along E-60.

8. The details of the proposed road project are:

- Rehabilitate and pave the project road from Dzirula to Chumateleti according to Georgian National Standard for Public Motor Roads (SST Gzebi 2009), Geometrical and Structural Requirements with 40 km/h design speed. The pavement within Kharagauli town may remain as is since this is still in fair to good pavement condition.
- Replace or repair of 19 bridges and 149 culverts.
- Construction of side drains and other drainage structures.
- Provision of retaining walls and river protection measures, where necessary.
- Provision of adequate road signing and marking.
- Provision of safety barriers.

9. The road is to be designed according to Georgian geometric design standard, and accordingly, it shall be sufficient to carry the traffic loading efficiently and with the vehicles from the opposite directions can pass safely. Effectively, these will be a two-lane road consisting of a carriageway width (sum of the width of lanes) and the width of the shoulders. The design elements for the cross section of the project road are as follows:

- |                                      |                                   |
|--------------------------------------|-----------------------------------|
| • Number of lanes:                   | 2                                 |
| • Lane width:                        | 3.00 m                            |
| • Carriageway width:                 | 6.00 m                            |
| • Width of shoulder:                 | 1.00 m (of which 0.50 m is paved) |
| • Increase of shoulder on embankment | 0.50 m                            |
| • Total road width:                  | 9.00 m                            |

10. The preliminary road design was carried out considering following design philosophy:

- The standards to be applied will follow the Georgian geometric design standard for the selected design speed of 40 km/h, with some flexibility in application when the strict application of the standards would result in an excessively costly technical solution.
- In general the design follows the existing alignment wherever possible and considers the existing structures. Where the existing alignment does not correspond to the proposed parameters, certain improvements depending on topography, build-up areas and structures are consider.
- The vertical alignment has been maintained in general, with improvements to the sight distances, where the existing topography allow for improvements. To accommodate new pavement layers, the road elevations have increased accordingly where possible.

- The design will result in a cost effective construction, considering the low traffic volumes on the road and the economic viability of the design.

### **Description of the Environment (Baseline Data)**

11. The general location for the project road is generally hilly and mountainous, located between Kolkheti and Shida Kartli lowlands and is characterized by higher hypsometric location. This region is surrounded by Caucasus Mountains from the North and by Lesser Caucasus mountains from South and includes basic geomorphologic elements of Georgia. The area of the study road is located between Kolkheti and Shida Kartli lowlands and is characterized by higher hypsometric location.

12. Based on the climate regionalization map of Georgia the region belongs to II climatic and II-b sub-region, having a climate that is dry, with much colder winter than on Kolkheti Valley. The study road runs over most of its length in the valley of the Chkherimela River which is one of the main tributaries of the Dzirula River. The other rivers that flow into Chkherimela River are Goroula, Jikhvela, Jinjura, Leghvana, and Bliskhevi.

13. Since no water quality data is available for Chkherimela River and Dzirula River, baseline measurements were done in five (5) sampling stations. Generally, the water quality along the river is within the permissible limit. To establish a baseline on Air Quality, Dust, and Noise four (4) measurements were done accordingly in selected spots, which are considered receptors of impacts, especially during construction period. As expected, the air quality (emissions and dust) and noise are at good levels prior to any construction activities and primarily due to low traffic volume through this road. The measured air quality results are much below the permissible national environmental standards.

14. Geo-hazards are either natural or man-made geological and environmental conditions that can cause or expose people, properties, infrastructure, and environment to potential harm, injury, disruptions, and destruction. For the project road the potential geo-hazards consist of river bank and road edge erosion, slope failure leading to landslide or mudslide, rock/stone fall, and snow avalanche in winter, to name a few.

15. The project road runs along the northern foothills of the Borjomi-Kharagauli National Park (BKNP), and along the Chkherimela and Dzirula Rivers. The BKNP is located in the central part of the Caucasus Isthmus and comprising the eastern section of the Lesser Caucasus Mountain chain. The BKNP has an approximate area of 80,000 hectares of forest ecosystems and sub-alpine and alpine meadows typical for the central region of the Lesser Caucasus within Georgia.

16. In Georgia the large diversity in plant species and plant communities in the region is caused by the three bio-geographic regions converging in the BKNP, which is adjacent to the project road, namely the Colchic and Eastern Caucasian, the Small Asian (Anatolian) and the Front Asian (Iranian). In the BKNP documents indicated that 55 mammal species, 95 bird species, 17 reptile species and 9 amphibian species have been identified. No protected area is impacted by the Project. Also no migratory route of endangered or protected species will be disrupted. This is because the road is already existing and will only be rehabilitated. Therefore no additional physical barrier is imposed. Also the road runs parallel to the River which is an already existing natural barrier for terrestrial animals.

17. The two (2) regions that are traversed by the road are Imereti region and Shida Kartli.

Most of the project road is within Imereti Region and largely within Kharagauli district. By tradition, Imereti is an agricultural region and is known for its mulberries and grapes. Shida Kartli is situated in a middle section of lowland between the Greater and Lesser Caucasian mountain range in East Georgia. The economic activity of Shida Kartli primarily consists of the following industries: agriculture (agricultural industry), production, tourism, trade (commerce), transport and communications, energy, construction (including roads and other infrastructure).

18. Most of the rural population along the project road depends on subsistence agriculture and livestock. As a rural and countryside setting, agriculture is expected to be the main industry with the main crops as corn, grapes and vegetables. The considered sensitive receptors in close vicinity to the project road are Dzirula School, Dzirula School, Moliti Ambulatory, and Moliti School.

19. Two (2) cultural monuments were found along the south side of the road: (i) locally called as the monument of “Giants” or “Devebi” monument; and (ii) a cultural monument dedicated to artist in the locality. The first monument is located at km 9+860 at the entrance of Kharagauli and the second one at km 13+086 after Kharagauli town. The monuments are located immediately adjacent to the road edge, but will be outside the construction strip of the project roads.

20. In terms of tourism interest, The BKNP is considered one of the most visited tourism sites in Georgia. The Park is covered with native forest and sub-alpine and alpine meadows, and is home to rare species of flora and fauna. The closest distance of the BKNP to the Project is 1.3 km. Therefore no impacts are expected.

### **Anticipated Environmental Impacts and Mitigation Measures**

21. Road and bridge construction entails a number of activities which are expected to introduce impacts and disturbances to the general environment, especially during the construction period. Most of these impacts are confined within the right-of-way, construction sites, and facility sites; while some activities can affect the outlying areas or even a wider area, especially if not properly mitigated.

22. Direct impacts are those that are clearly introduced by the project during the construction period such as modification of the physical land features at the specific construction site. Indirect impacts are those that are consequences of the changes in the environment or secondary effects due to the introduced changes, which can occur or accumulate beyond the construction phase. Both of these direct and indirect impacts can be classified as minimal to adverse depending on the level of intensity that they affect the natural environment components, such as air and noise, flora and fauna, water, topography, and landuse.

23. During the pre-construction and detailed engineering phase, the design engineers should be guided on a number of items need to be considered in the production of road and bridge designs, and which will have relevance to the environmental aspects of the project such as (i) impacts of erosion; (ii) geology and seismic conditions; (ii) Flora and fauna; and (iii) Health and Safety

24. During the actual construction phase, practically most of the significant impacts are likely to occur on the account of the actual disturbance to the existing environment. The construction would entail a series of activities at the specific work sites and in other selected areas for

material sources, processing plants, campsites and vicinities. At the initial phase, where the old bridge structures will be demolished to make way for new ones, detour roads will be established

25. The typical construction process will entail, first the closure or restriction of existing traffic at the work sites and establishment of detour road. The provision of the new detour road will entail, stripping and clearing of vegetation, excavation, filling and leveling of the area, provision of embankment fill and necessary surfacing for the existing traffic.

26. Road widening will entail earthwork and breaking of rocks, which need to be hauled to some designated stockpiles. These works by themselves disturb the natural surroundings, and affect vegetation. It is important that measures for proper maintenance of the detour road be established to respond to traffic and community safety, control of dust, noise and emissions. Replanting of affected trees should be done as soon as possible and schemes for detour roads and soil stockpiles should favor tree preservations. Waterways should be respected and contamination should be prevented.

27. The projected service life of the road is 20 years and over this operations period, the impacts to the environment are rather viewed as cumulative on account of the functions of the road components and can be in conjunction with other activities. Time-wise these impacts can also be long-term as they may manifest after construction and continue to persist for the entire usage and operation of the road. The perceived impacts will be on traffic safety to the communities, biodiversity, water quality, air quality and noise-level during the operation of the road.

28. Corresponding to the prediction of impacts is the identification of the measures to avoid, reduce, mitigate, and replace or compensate these impacts. Included in the assessment is the determination of opportunities wherein the project activities can contribute to the enhancement of the projects sites where impacts will be recognized. Impacts and measures form part of the Environmental Management Plan for the Project.

### **Analysis of Alternatives**

29. The road is envisioned to have a design speed of 40kph with pavement most probably asphalt concrete. The road, when completely rehabilitated and reconstructed, shall fully and efficiently function either as a local road to service the population within the area or/and serve as a strategic alternative for through- traffic alternate road to the E60 – Rikoti Tunnel route.

30. As a matter of procedure, initial project screening required a basic cost-effectiveness calculation to ensure that the most efficient option would be selected for detailed appraisal. Subsequently, the study considered three (3) slightly different alignments options based on how strictly the design standard was followed. The summarized descriptions of the options are as follows:

- Without project Alternative: no improvement of the project road.
- With project, Option No. 1: Design following strictly the standard of this category road.
- With project, Option No. 2: Design following the standard wherever possible, but departing from standard to avoid costly construction solutions and extensive resettlement. Absolute minimum values at these locations are: design speed 20 km/h, curvature radius 20 m, pavement width 6.0 m.

- With project, Option No. 3: Following the existing alignment, re-designing only the most critical section resulting longer sections with sub-standard design.

31. Based on this discussion and the mutual site visit of the Road Department and the Consultant, **Option 2 (the Preferred Alternative)** was the alternative selected for detailed appraisal and further design.

32. Since the existing road was not constructed to the design parameter for the envisaged design speed, a departure from standard was observed at about 40 locations. A joint site visit with representatives of the Roads Department took place to assess in particular the design alternatives in the field where the alignment is not matching to the desired design parameter. During the field visit an agreement with the Roads Department was reached on the design parameter for the critical locations, where the desired minimum parameter in accordance to the Georgian design standard could not be maintained. The agreed solutions at the critical locations are shown in the Feasibility Study.

33. For the rehabilitation options, pavement alternatives (asphalt concrete and cement concrete) were also conceptualized. These were all part of technical studies which were presented in the feasibility study report as preliminary design. In terms of procurement of works, the Design-Bid-Build Option is being recommended over the Design-Build Option to ensure that Environmental and Social Safeguards requirements will be fully adhered to during the implementation of the project.

### **Consultation, Participation and Information Disclosure**

34. The project had a number of public consultation meetings with the local population in the project road area. The first two were mainly done to introduce the project and discuss the importance of the road to the local, regional and country setting. The next three public consultations were specifically for environmental aspects of the road construction. The social sector also had public consultations focusing on the land property compensation aspect.

35. The first meeting with the local people was held in Kharagauli in May 2014 while the second meeting took place in Moliti in August 2014. In these meetings, the Consultant gave a presentation of the project road and answered the questions raised by the audience.

36. In accordance with ADB's Public Communications Policy (2005) and SPS (2009), Public Consultation meetings on the environmental aspects were undertaken on 15 November 2014 in three locations along the project road. These were in Kharagauli, Moliti and Chumateleti. During the said public consultation the Consultant (Kocks Consult, GmbH), prepared PowerPoint presentation regarding the technical features of the project and explained the potential environmental and social impacts with corresponding mitigation measures. This event was also attended by Roads Department representative. At these instances, the participants were able to express what they thought about the project and were given a chance to ask clarificatory questions during the open forum. Forms were provided to the people for them to write in their own comments to be forwarded to the Roads Department.

37. The IEE shall also be disclosed to a wider audience via the ADB website. During the project implementation, periodic environmental monitoring reports shall be submitted by Implementing/Executing Agencies and correspondingly also be uploaded in the ADB website.

## **Grievance Redress Mechanism**

38. As most of the impacts are construction-related, and therefore it is anticipated that improper or inadequate implementation of Environmental Management Plan may lead, at worst, to dispute and conflicts; or at best only to disturbance and inconvenience to local people. In order to provide a direct channel to the affected persons for approaching project authorities and have their grievance recorded and redressed in an appropriate time frame, a Grievance Redress Mechanism shall be established during the project implementation, which will be operational throughout the construction period.

39. During the actual operationalization of the Grievance Redress Mechanism, the process and communication flows will be centered with GRM Coordinator. The GRM Coordinator will take initiative to be observant of any issue and will try to obtain information which will be used at the subsequent GRM process stages.

## **Environmental Management Plan**

40. The Environmental Management Plan (EMP) for the project road, consisting of impact mitigation and monitoring plan, has been prepared as part of this IEE. A program of monitoring, the Environmental Monitoring Plan (EMoP), is also developed herein to ensure that all concerned agencies take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be necessary.

41. This EMP/EMoP will be part of the contract documents consisting of specified measures covering most of the possible issues that can occur will enable the avoidance, reduction, and mitigation of adverse impacts in the project cycle. The Contractor shall adopt the measures, particularly those for the construction into his Site Specific Environmental Management Plan (SSEMP) consistent with their own work program. Supplementary Plans will also be drawn up by the Contractor for specific situations to ensure a focused action on any problem that might arise.

42. Operational framework of the EMP involves the national agencies (MRDI-RD & MoENRP), ADB Safeguard Specialists, Construction Supervision Consultant, Contractor, with the local governments and recognizing roles of NGO's and people's organization at the project site.

## **Conclusions and Recommendations**

43. The IEE/EMP-EMoP, as part of the contract documents, shall be adhered to by the Contractor. Accordingly, the Contractor shall require all his Sub-Contractors to follow also the EMP and such stipulations should also be shown in Sub-contracting agreements and which will be verified by the Engineer (or the CS Consultants).

44. Upon assessment of the impacts in this IEE process, the project is maintained at Environmental **Category B**; since the predicted impacts are "site-specific, with few irreversible, and in most cases mitigation measures can be readily designed and to be incorporated in the detailed designs.

45. Mitigation measures have been developed to be utilized for finalization in the detailed design phase, for implementation in the construction phase, and subsequently for the operations phase, to reduce all negative impacts to acceptable levels.

46. As per assessment in this IEE, the proposed Road Project is unlikely to cause any



adverse irreversible environmental impacts. To ensure environmental and social safeguards, the IEE recommends that:

- proper design should be produced;
- the strict monitoring is done;
- measures be implemented; a
- void socioeconomic impact – hire local people;
- IEE with the EMP/EMoP should be part of the Contract Documents;
- Contractor should have SSEMP;
- baseline measurements and periodic monitoring be done;
- Contractor to designate environmental staff; and
- Contractor to provide sufficient Safeguards training to staff.

## **B. Introduction**

### **1. Purpose and Context of the Report**

47. The Government of the Republic of Georgia (the Government) has requested the Asian Development Bank (ADB) to provide financial assistance for the Secondary Road Improvement Project focusing on a 50-km road starting at Dzirula, and passing through Kharagauli, Moliti, Pona and ending in Chumateleti. This road starts from the west at E60 within Zestafoni District, through Kharagauli District and connects again with E60 in the east within Khashuri District, effectively becoming an alternate road of the E60 – a pass that goes through mountainous paths and Rikoti Tunnel. The rehabilitation and improvement of this road hopes to:

- Improve national connectivity and reliability of the transport network by serving as an alternative to the highway and the railway.
- Improve the mobility of the municipality's population; encourage subsistence farmers to increase production; an improved bus shelters and access to the project road at local railway stations will increase local passengers' comfort and convenience; and promote road-rail integration.
- Boost investment to develop the area's natural spring water supply and provide added benefit to local tourism by visitors able to use the project road than the slower southern entrance to the Borjomi–Kharagauli National Park.
- Provide an opportunity to test the use of a Geographical Information System (GIS) for better managing environmental and social issues from the preparatory stage to project completion and beyond.

48. The Roads Department (RD) will be the Project Implementation Unit (PMU) under the Ministry of Regional Development and Infrastructure (MRDI) that shall be the Executing Agency (EA) for this project during the construction stage. As initial part of the possible funding assistance, the ADB has engaged Kocks Consult GmbH, Germany, to prepare a Feasibility Study and Preliminary Design for the entire project. The consultancy scope also includes an Initial Environmental Examination (IEE); and a social and poverty analysis and impact assessments, in accordance with ADB's Safeguard Policy Statement (SPS) 2009.

49. With reference to the Contract Agreement for Consultancy Services for the engagement, one of the main tasks of the Consultant is to prepare the Initial Environmental Examination (IEE) for the project in accordance with the requirements of the ADB's Safeguard Policy Statement (SPS) 2009; and also the relevant legislation of the Government of Georgia. Such environmental safeguard requirements specify that the borrowers/clients are to undertake an environmental assessment process which entails assessing impacts, planning and managing impact mitigations, preparing environmental assessment reports, disclosing information and undertaking consultation establishing a grievance mechanism, and monitoring and reporting. The IEE document shall also include particular environmental safeguard requirements pertaining to biodiversity conservation and sustainable management of natural resources, pollution prevention and abatement, occupational and community health and safety, and conservation of physical cultural resources.

50. This IEE document includes an Environmental Management Plan (EMP) based on the identified potential impacts, their characteristics, magnitude, distribution, and duration, sensitive receptors and affected groups. The EMP shall address the potential impacts and risks identified by the environmental assessment with the corresponding mitigation measures designed to minimize, reduce and mitigate (or compensate the affected parties) and to be implemented for

the entire project cycle.

## **2. Extent of IEE Study**

51. The Secondary Road Project for the rehabilitation and improvement of Dzirula-Kharagauli-Moliti-Pona-Chumateleti road in the Republic of Georgia is classified under the ADB Safeguard Policy Statement 2009 as environment Category B, requiring an Initial Environmental Examination. The purpose of this IEE is to assess potential environmental, health, safety and social impacts of the proposed road project. With the expected construction scope it is expected that few impacts, if any, are irreversible, and in most cases mitigation measures can be designed to avoid or minimize them.

52. The IEE study was conducted based on secondary information from a number of available sources, while primary data were obtained from field parametric measurements along with the observations gathered from several field visits. Pursuant to ADB's SPS 2009, Public Consultations were done in Kharagauli, Moliti and Chumateleti, with the invitation to the public published in a local newspaper<sup>2</sup> and likewise duly announced by district officials to the local population. The public consultations were attended by residents of the communities mentioned as well as those from surrounding villages.

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<sup>2</sup> The announcement for the public consultation meetings was published in the newspaper "Republic of Georgia" No. 237 dated 13 Nov. 2014.

## C. Policy, Legal, and Administrative Framework

### 1. National Legal Framework

53. The Fundamental Law in which all legalities are referred to is “**The Constitution of Georgia**”, which was adopted in 1995. While the Constitution does not straightforwardly address environmental subjects, it does lay down the legal framework that guarantees environmental protection and public access to information with regard to environmental conditions as follows:

- Article 37, Part 3, states that “any person has the right to live in a healthy environment, use the natural and cultural environment. Any person is obliged to take care of the natural and cultural environment.”
- Article 37, Part 5, states that “an individual has the right to obtain full, unbiased and timely information regarding his working and living environment.”
- Article 41, Part 1, states that “a citizen of Georgia is entitled to access information on such citizen as well as official documents available in State Institutions, provided it does not contain confidential information of state, professional or commercial importance, in accordance with the applicable legal rules”.

54. The **Law of Georgia on Environment Protection (1997)** regulates the legal relations between the state establishments and physical or legal entities in the field related to the use of territorial waters, air space, including continental shelf and special economic zones, environmental protection and natural resources on the territory of Georgia. The Law regulates the standards of the environmental protection and issues on environmental management; it describes the economic sanctions, standards and issues on environmental impact, various issues on protection of the natural ecosystems and biodiversity, and global and regional management issues. In addition to the above-mentioned, the Law considers the major principles of waste management. Article 34 of this law stipulates the provision on ecological requirements for the waste – an entrepreneur is obliged to reduce the generation of industrial, domestic and other types of waste, ensure their treatment, utilization, placement or burying by considering the environmental, sanitary-hygienic and epidemiological standards and rules. Additionally, the Law defines the requirements for the placement of toxic, radioactive and other hazardous waste and prohibits their discharge in the surface water sources.

55. **Law of Georgia on Licenses and Permits (2005)** defines the list of activities needing licenses or permits, including so called “Environmental permit”. It also defines the requirements for the license or permit issuances. The Law, together with the normative by-laws, regulates such organized activity or action, characterized by increased hazard to the human life or health, affects particularly important state or public interests or is related to the use of a state resource. The given Law regulates the field activities by a license or permit; it gives a thorough list of licenses and permits, establishes the rules to issue the licenses and permits, makes amendments to them or abolishes them. Under the Law, a state regulation of the activity or action through a license or permit is undertaken only when the given activity or action is directly associated with the increased hazard to the human life or health or fields of state or public interests. The state regulation is undertaken only when the issuance of a license or permit is a real means to reduce the hazard in question or consider state or public interests. The aim and major principles of regulating the activity or action via licenses or permits are as follows:

- Provision and protection of human life and health;

- Safety and protection of a human's residential and cultural environment;
- Protection of state and public interests;

56. **The Law of Georgia on State Ecological Expertise (2007).** Under the given Law, the ecological expertise is a necessary measure for making decision on the issuance of environmental and/or construction permit(s). The aim of the ecological assessment is to protect the ecological balance by considering the requirements of environmental protection, rational use of natural resources and principles of sustainable development. A positive conclusion of the ecological expertise is mandatory for obtaining an environmental and/or construction permit. In addition, the holder of environmental and/or construction permit is obliged to comply with conditions specified in the ecological expertise conclusion. The process of ecological assessment is regulated by the Ministry of Environmental and Natural Resources Protection. The procedure to be observed during ecological expertise, as well as the requirements on forming the expert commission is prescribed in the Provision on the Rule for Carrying out Ecological Expertise, which is approved by the Minister of Environment Protection of Georgia.

57. **The Law of Georgia on Environmental Permit' (2008)** fully enumerates the activities within Georgia that are subject to mandatory ecological expertise. The Law defines the legal aspects of issuing an environmental permit, undertaking the ecological expertise, informing the public and participating in the given procedures. Under the Law, the environmental permit is the authorization to realize the planned activities. Under the Law, an environmental permit is issued by the Ministry of Environmental Protection and Natural Resources of Georgia based on the review/expertise of the application of an applicant for the environmental permit. The aim of the Law is to ensure the protection of a human health, natural environment, physical assets and cultural heritage during the activity.

58. The state ensures protection of the environment and, correspondingly, protection of water as its main component in **The Water Act of Georgia** (16 October 1996). All residents of Georgia are liable to ensure the rational and sustainable use and protection of water. They have to prevent its contamination, pollution and depletion. The dumping of industrial, household and other garbage and wastes in water bodies is prohibited according to this act. The disposal of industrial, household and other effluents into water bodies is permitted on the basis of a license by the Ministry. With the objective of protecting the Black Sea and preserving its ecological system, all natural and legal persons (including foreigners) are obliged to take measures for preventing pollution of the sea with wastewater from the sources of pollution located on the land. The use of a surface water body for discharging industrial, communal-household, drainage and other wastewater is allowed only under a water use license issued on the basis of the Ministry-approved multipurpose water utilization plans and water management balance-sheet.

59. **The 'Law of Georgia on Cultural Heritage'** was approved in May of 2007. Article 14 of the Law specifies the requirements for 'large-scale' construction works. According to this Article, a decision on treatment and ore extraction on the whole territory of Georgia, as well as on construction of an object of a special importance as it may be defined under the legislation of Georgia, is made by a body designated by the legislation of Georgia based on the positive decision of the Ministry of Culture and Monument Protection of Georgia. The basis for the conclusion is the archeological research of the proper territory to be carried out by the entity wishing to accomplish the ground works. The entity wishing to do the ground works is obliged to submit to 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.

60. The aim of the **Law of Georgia on Public Health** is as follows: Promotion of the introduction of a good health and healthy lifestyle of the population; Creation of the environment, which is safe for a human health; Promotion of the protection of the reproductive health of a family; Prevention of infectious and non-infectious diseases. The Law defines the rights and obligations of the population and legal entities in the field of public health. Aiming at establishing the environment safe to the public health, the Ministry sets the qualitative standards for the environment safe for a human health (atmospheric air, water, soil, noise, vibration, electromagnetic radiation), including maximum permissible concentrations and rates of harmful impact. The standards are mandatory. Every person on the territory of Georgia is obliged not to carry out the activity, which causes a hazard of the infectious and non-infectious diseases to spread and helps the origination of the risks to human health; protect the sanitary and epidemiological standards; to supply the information to the public health department about all emergencies caused by the violation of the sanitary norms in the production or technological process, etc. The observance of the standards is controlled by appropriate state structures. The responsibility for the internal and external audits rests with a certified, independent laboratory.

61. The Law of Georgia **“On the Red List and Red Book” (2003)** regulates the legal relations in the field of developing the Red List and Red Book, protecting and using the endangered species. This excludes the legal issues of the international trade with endangered wild animals and wild plants, which within the limits of the jurisdiction of Georgia, are covered in the Convention ‘On the international trade with the endangered species of wild fauna and flora’ concluded on March 3 of 1973 in Washington D.C. As per Article 10 of this Law, prohibits 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. The Red List of Georgia was approved by the Presidential Decree No. 303 ‘On approving the Red List of Georgia’ (May 2, 2006).

62. Other National Environmental Legislations and Applicability are shown the Table below.

**Table 1: National Environmental Legislations**

Legislation	Applicability	Remarks
Forestry Code of Georgia	Applicable to works located in forest areas	Requires permission from the Ministry of Economy and Sustainable Development (MESD). The project proponent shall submit application to the MESD, which in turn forwards it to the Forest Division of MoENRP for its review and advise, based on which the MESD gives an approval to proceed with works in forest areas
Law on Ambient Air Protection, 2000		It stipulates Maximum Allowable Concentration (MAC) of various pollutants in Ambient Air; however the establishment of emission standards for various sources or activities is under process, therefore at present no standards are available
Law on System of Protected Areas, 1996	Applicable to works or activities in protected areas	Depending on the activity and type of protected area, permission for any work will be granted or denied
Technical Regulation of Drinking	Applicable to water	Water supply and monitoring shall comply

Legislation	Applicability	Remarks
Water, 2007 (Decree N 349/N), the Ministry of Labour, Health and Social Affairs of Georgia	supply projects	with the technical regulation
Rules of the Protection of the Surface Waters of Georgia from Pollution, 1996 (№130 order of the Ministry of the Protection of the Environment and Natural Resources of Georgia)	Applicable to water supply projects	Source water quality shall comply with the provisions for domestic use
Technical Regulation of Environmental Protection, 2008 (Decree N745), Ministry of the Protection of the Environment and Natural Resources of Georgia	Applicable to sewerage projects	Treated effluent disposal from sewage treatment plants shall comply with the specified standards
Georgian Noise Quality Standards in Residential Areas (Health, Labour and Social Affairs [297n of August 16, 2001])		The Georgian standards for noise control as approved by the Decree of the Minister for Health, Labour and Social Affairs (297n of August 16, 2001) upon the 'Approval of Environmental Quality Standards'; specifying the tolerable and maximum admissible levels of noise for different zones

Source: The Consultant (from various reviewed and researched documents).

63. Some of the **International Treaties and Conventions** Ratified or Signed by Georgia are provided in the list below.

- Ramsar Convention on Wetlands (1996);
- United Nations Framework Convention on Climate Change (UNFCC) (1994);
- Kyoto Protocol (1994);
- Kyoto Protocol (1999);
- Basel Convention on the Control of Transboundary Movement of Hazardous Waste and Their Disposal (1999);
- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) (1999);
- Convention on Biological Diversity (1994);
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1996);
- Convention on Long-range Transboundary Air Pollutants (1999);
- Stockholm Convention on Persistent Organic Pollutants (2006);
- Convention on the Conservation of European Wildlife and Natural habitats (2008);
- The Vienna Convention for the Protection of the Ozone Layer (1995);
- Montreal Protocol on Substances that Deplete the Ozone Layer (1995).

## 2. Institutional and Administrative Framework

64. The Ministry of Environment and Natural Resources Protection (MoENRP) of Georgia was established in 1991 with the following goals:

- To support sustainable development of the country in the field of environment;

- To organize environmental planning system;
- To elaborate and implement state policy, target programs, strategy of environmental protection for sustainable development, national environmental action programs and management plans in the field of environmental protection and natural resources;
- To protect and preserve unique landscapes and ecosystems, rare and endangered species of flora and fauna that are characteristic for the country, biodiversity, atmospheric air, water, land and mineral resources;
- To implement public administration (regulation, registration, supervision and control) on waste management and chemicals; to follow the Georgian legislation in the field of environmental protection; and
- To implement the international commitments within its competence

65. Within the MoENRP is the **Service of Permits**, which is structural subdivision of the Ministry. The functions of Service of Permits within its competence are as follows:

- To organize implementing ecological expertise and to carry out the coordination of the activity on this purpose;
- To check announcements and submitted documents presented by the individual who wants to obtain a permit definite time if they are relevant to the demands determined by Georgian legislation;
- To get, register and work out documents necessary for issuing permits;
- To issue certificates of permits (environmental impact permit;
- To take changes in permits;
- To take part in the process of discussing complaints and suits according to administrative and legislative law together with relevant services;
- To consult with the citizens.

66. For of historical and cultural preservation requirements of any construction project, the **Ministry of Culture and Monument Protection** of Georgia is in charge of regulating activities related to preservation of Georgian culture and its cultural monuments responsible for the supervision of the construction activities in order to protect archaeological heritage. Part of the Competencies of the Ministry as stipulated in the Law of Georgia on Cultural Heritage Protection is “together with relevant bodies as prescribe by the legislations of Georgian, to “suspend all kinds of activities that can endanger cultural heritage” (Title II, Chapter II, Article 5 i)). This provision of the law will have direct relevance in case archeological finds do occur in the project sites.

### 3. Environmental Standards

67. Environmental quality standards in Georgia ensure both MPC (Maximum Permissible Concentration) and MPE (Maximum Permissible Emission). The maximum permissible concentration (MPC) is approved by law hygienic standards. MPC refers to a concentration of chemical elements and their compounds in the environment, which in everyday impact for a long time on the human body does not lead to pathological changes or diseases due to established modern research methods in any time of life of present and future generations. The maximum permissible (or allowable) emissions (MPE) is the standard of maximum permissible emissions of harmful substances (pollutants) into the air, which is set for a stationary source of air pollution in accordance with technical standards for emissions and background air pollution. It provides non-exceeding of the hygiene and environmental air quality standards, limits



(critical) loads on ecological systems and other environmental regulations requirements.

68. The following table gives an overview of the National Standards and regulations that are applicable to the Project.

**Table 2: List of Environmental Standards**

<b>Adoption year</b>	<b>Name of Normative Document</b>	<b>Registration Code</b>
31/12/2013	Technical Regulation – “methods of calculating maximum permissible discharges of pollutants together with wastewater into surface water bodies”, approved by the decree №414 of the Government of Georgia.	300160070.10.003.017621
31/12/2013	Technical Regulation – “Protection of Surface Water Contamination”, approved by the decree №425 of the Government of Georgia.	300160070.10.003.017650
03/01/2014	Technical Regulation – “Operation of Dust-Trapping Devices”, approved by the decree №21 of the Government of Georgia.	300160070.10.003.017590
03/01/2014	Technical Regulation – “The unfavorable weather conditions for Protection of Environment”, approved by the decree №8 of the Government of Georgia.	300160070.10.003.017603
31/12/2013	Technical Regulation – “Methods of calculation of maximum permissible emission of hazardous substances into ambient air”, approved by the order №408 of the Government of Georgia	300160070.10.003.017622
06/01/2014	Technical Regulation – “Method for inventory of Stationary Sources of Air Pollution”, approved by the decree №42 of the Government of Georgia.	300160070.10.003.017588
03/01/2014	Environmental Technical Regulation – approved by the decree №17 of the Government of Georgia.	300160070.10.003.017608
14/01/2014	Technical Regulation – “Environmental Damage Determination (calculation) Method”, approved by the decree №54 of the Government of Georgia.	300160070.10.003.017673
31/12/2013	Technical Regulation – “Methods of calculating the actual amount of emissions according to instrumental methods for determining the actual amount of emissions in ambient air from stationary sources of pollution, list of special measuring and controlling equipment for determining the actual amount of emissions in ambient air from stationary sources of pollution and technological processes from stationary pollution sources,” approved by the order №435 of the Government of Georgia	300160070.10.003.017660
31/12/2013	Technical Regulation – “Fishing and protection of fish stock”, approved by the order №423 of the Government of Georgia.	300160070.10.003.017645
31/12/2013	Technical Regulation – “Quarries Safety”, approved by the order №450 of the Government of Georgia.	300160070.10.003.017633
31/12/2013	Technical Regulation – provisions on “Determining Levels of Soil Fertility ” and “Soil Conservation and Fertility Monitoring”, approved by the decree №415 of the Government of Georgia.	300160070.10.003.017618
31/12/2013	Technical Regulation – “Topsoil Removal, Storage, Use and Cultivation”, approved by the decree №424 of the Government of Georgia.	300160070.10.003.017647
15/01/2014	Technical Regulation – “Maximum Allowed Concentrations of harmful substances at work places”, approved by the order №70 of the Government of Georgia	300160070.10.003.017688
15/01/2014	Technical Regulation on “Drinking Water”, approved by the decree №58 of the Government of Georgia.	300160070.10.003.017676
31/12/2013	Technical Regulation – “water protection zones of small rivers in Georgia”, approved by the decree №445 of the Government of Georgia.	300160070.10.003.017646
03/01/2014	Technical Regulation – “Radiation safety standards within the territory of Georgia”, approved by the decree №28 of the Government of Georgia.	300160070.10.003.017585
31/12/2013	Technical Regulation – on “water protection zones”, approved by the decree №440 of the Government of Georgia.	300160070.10.003.017640
03/01/2014	Technical Regulation – “sanitary rules of water sampling”, approved by the decree №26 of the Government of Georgia.	300160070.10.003.017615

Adoption year	Name of Normative Document	Registration Code
04/08/2015	Technical Regulation – “Rules of reviewing and coordinating the company's waste management plan”. Approved by the decree №211 of the Minister of Environment and Natural Resources Protection of Georgia.”	360160000.22.023.016334
11/08/2015	Technical Regulation – “Arrangement, operation, closure and post-care of landfills”. Approved by the decree №421 of the Minister of Environment and Natural Resources Protection of Georgia. “	300160070.10.003.018807
17/08/2015	Technical Regulation – “Determination and classification of the list of waste according to their types and characteristics”. Approved by the decree №426 of the Minister of Environment and Natural Resources Protection of Georgia. “	300230000.10.003.018812
01/08/2016	N 422 decree of the government of Georgia, dated as August 11, 2015 on “Waste recording, reporting ways and content ”	360100000.10.003.018808
15/01/2014	Technical Regulation – “sanitary norms and rules for the collection, storage and treatment of waste from therapeutic and prophylactic institutions.” Approved by the decree №64 of the Government of Georgia on January 15, 2014.	300160070.10.003.017682

#### 4. Permitting Processes

69. In Georgia, the issuance of environmental permit is covered under the Law on Environmental Impact Permits (EIP), which has entered into force in January 2008. Consistent with other relevant environment protection law, the tasks of this Law are as follows:

- a) To define and protect the rights and responsibilities of a developer, public and the State in the field of permitting;
- b) To protect the environment and natural resources from irreversible qualitative and quantitative changes and promote their rational use.

70. As stated, a person intending to undertake any of the listed Activities in the Law shall initiate the process of obtaining the Permit from the Ministry (Ministry of Environment and Natural Protection) according to the following the steps:

- **STEP 1: Environmental Impact Assessment** – The first step is to undertake Assessment<sup>3</sup> process, the objective of which is to examine the activity vis-à-vis the protection of various components of the environment, population, landscape and cultural heritage. The assessment shall study, identify and describe any direct and indirect impact of the Activity on human health and safety, vegetation and animals, soil, air, water, climate, landscape, ecosystems and historical monuments, or the combination of these factors, including the impact of these factors on cultural heritage and socio-economic factors. The Assessment shall also include the development of strategies for impact control and monitoring, mitigation and prevention. The assessment shall be compiled in an Environmental Impact Assessment Report which shall also outline the possible areas of risk and provides proactive solutions to foreseeable emergencies. A Public Hearing (Consultation) shall be held to involve the public with prior announcement to the public.
- **STEP 2: Application to the Ministry** – An application shall be submitted by the Permit Seeker to the Ministry with official request for the Issuance of a Permit. The application shall be presented along with the required project documentation.

<sup>3</sup> Contrary to ADB's SPS 2009, in Georgia, there is no categorization of projects; hence all impact assessment for any project is referred to as Environmental Impact Assessment.

- **STEP 3: State Ecological Expertise (SEE)** – To assess the potential ecological risks of the planned Activity, and Expertise shall be utilized as a means to ensure that the ecological balance of the environment is maintained through rational nature management, sustainable development, and compliance with environmental norms and standards. The Expertise shall evaluate the possible or expected impact on the environment, in view of high public interest in the planned Activity. This is normally done by the Department of Environmental Impact Permits under the Ministry, through which an expert commission shall be formed. The Expertise shall draw conclusion in which a positive would result in an issuance of the Permit while a negative will mean a rejection.
- **STEP 4: Issuance of the Permit** – After the Conclusion of the Expertise task of evaluation, a positive conclusion will be the basis for the Ministry to issue a Permit within 20 days from the registration of the application. The Permit shall oblige the Permit-holder to (i) Perform Activities in compliance with the terms of the Conclusion; (ii) Implement the measures for mitigating environmental impact; (iii) Implement the measures envisaged in the Report, which are also duly reflected in the Conclusion and/or its terms. In case of Rejection, the Permit Seeker can still appeal to higher administrative body (or official), or the courts of Georgia.

71. During the implementation of the Activity, the Department of Environmental Supervision under the Ministry (the "Department") controls compliance with the terms and conditions of the Permit by the Permit-holder by means of selective examination.

## 5. Required ADB Environmental Approval

72. ADB requires the consideration of environmental issues in all aspects of its operations. Superseding the previous environment and social safeguard policies, ADB's Safeguard Policy Statement, 2009 (SPS, 2009) sets out the policy objectives, scope and triggers, and principles for three key safeguard areas: (i) environmental safeguards, (ii) involuntary resettlement safeguards, and (iii) Indigenous Peoples safeguards. ADB adopts a set of specific safeguard requirements that borrowers/clients are required to meet in addressing environmental and social impacts and risks. Borrowers/clients comply with these requirements during project preparation and implementation. The environmental safeguard requirements are indicated in Appendix 1 of SPS 2009 (Safeguard Requirements 1: Environment). This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, and loans involving financial intermediaries, and private sector loans.

73. In the ADB's **Screening and Categorization**, the nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impact are assigned to one of the following four categories:

- (i) **Category A.** Projects could have significant adverse environmental impacts. An environmental impact assessment (EIA) is required to address significant impacts.
- (ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. 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 IEE is

required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.

- (iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- (iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

74. **Environmental Management Plan:** An Environmental Management Plan (EMP) which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

75. **Public Disclosure:** ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

- (i) For environmental category A projects, draft EIA report at least 120 days before Board consideration;
- (ii) Final or updated EIA and/or IEE upon receipt; and
- (iii) Environmental Monitoring Reports submitted by Implementing/Executing Agencies during project implementation upon receipt

76. ADB also requires public consultation in the environmental assessment process. For Category-B projects, the borrower must consult with groups affected by the proposed Program and with local nongovernmental organizations (NGOs) if possible. The consultation needs to be carried out as early as possible in the Program cycle so that views of affected groups are taken into account in the design of the Program and within the mitigation measures proposed. Any compensation related grievance redress issues will be resolved according to the Program's Resettlement Framework.

## D. Description of the Project

### 1. Project Setting and Location

77. The project road is a 50.404-km west to east secondary road, which starts from E60 junction in Dzirula and ends at Chumateleti at a connection with E60. Most of the project road is within Imereti Region with a few kilometers within Shida Kartli Region, through a gorge with mountain ranges with on both the northern and southern part. It is envisioned that this road when improved will enhance connectivity to a number of towns and villages at the foothills of the mountain ranges and can act as alternate route to parallel segments along E-60, which is the main international corridor that traverses most of the major cities of Georgia.

78. In accordance to the Presidential Decree #287, dated May 27, 2011, the Dzirula–Kharagauli–Moliti–Pona–Chumateleti Road (SH-55) is classified as road with interstate importance. Accordingly, interstate road shall connect the capital cities, industrial and administrative centers of autonomous republics, or connect them with the roads of international importance.

79. Practically, the entire road alignment is nestled by the mountain ranges at the foothills of the Borjomi–Kharagauli National Park. In most parts, it runs westwardly along the Dzirula River and the Chkherimela River. Also, a considerable stretch of the project road runs alongside the railroad track of the Georgian Railway, which is currently under rehabilitation and construction.

80. The general environment is generally characterized by largely rural and agricultural settings, except when the road goes through Kharagauli, where most of the population resides as well where commercial establishments are set up. In the lower stretches, farmlands and orchards are the usual land use features, while in the upper stretches, the roads runs through the edge of sparse forest vegetations as in meanders alongside the river.

81. The entire project road is primarily within Georgia's Imereti region with a few kilometers at the eastern end which is part of Shida Kartli region. It starts from a junction with E60 in the municipality of Dzirula and connects again with E60 at the east end in the village of Chumateleti, which is part of Surami municipality. This road will possibly serve as alternate road to E60 especially during the winter seasons when the Rikoti Tunnel area becomes impassable. The table below shows the Geographical Jurisdictions that the road traverses or is near to.

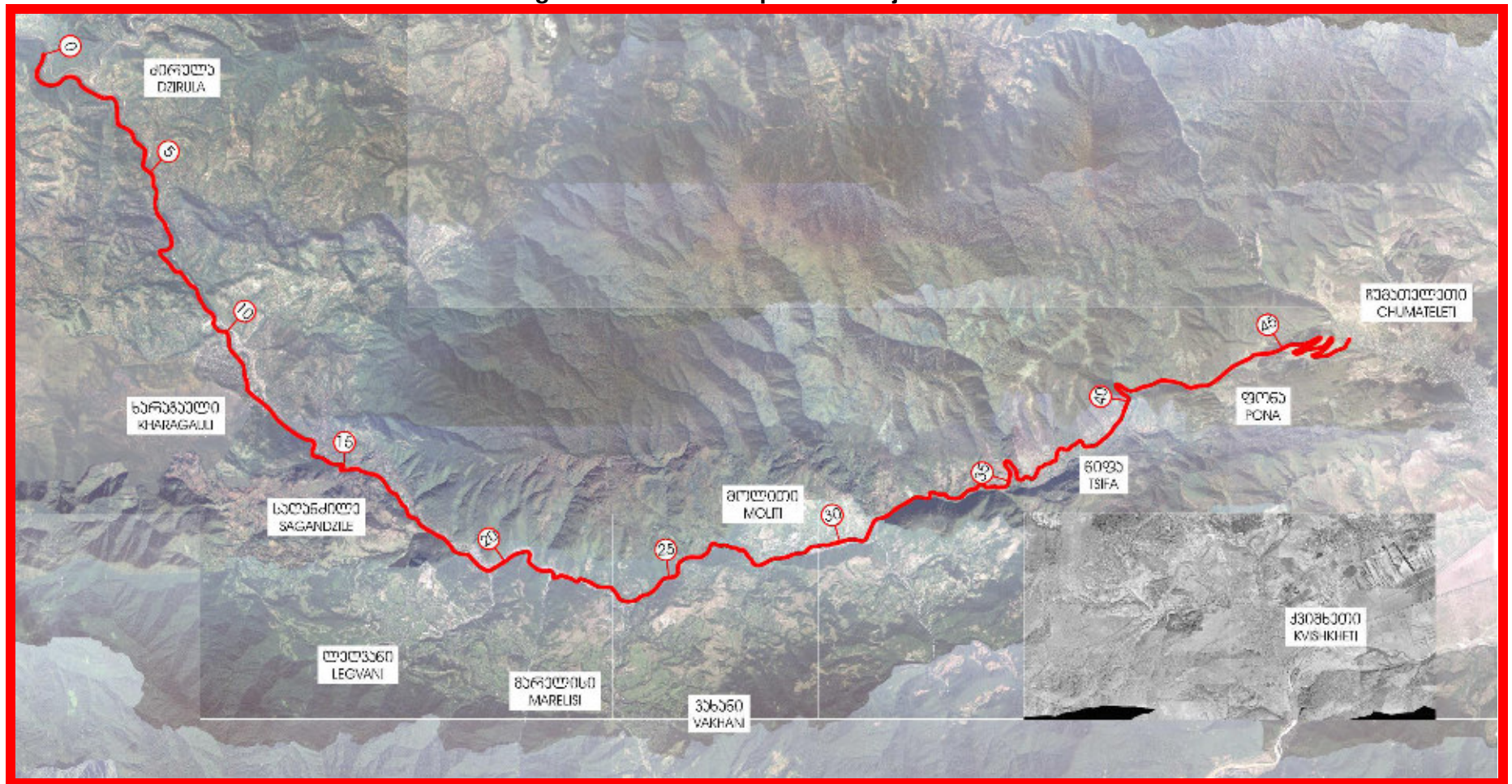
**Table 3: Geographical Jurisdictions along the Project Road**

No.	Municipalities	Districts	Regions
1	Dzirula	Zestafoni	Imereti
2	Ilemi		
3	Lahse		
4	Kitskhi	Kharagauli	
5	Bazaleti		
6	Daba Kharagauli		
7	Sagandzile		
8	Legvani		
9	Vakhani		
10	Moliti		
11	Zvare		
12	Tsifa		
13	Kvishkhети	Khashuri	Shida Kartli
14	Surami		

Source: The Consultant.

82. In most parts, the road runs along the Dzirula River and crossing the river from south bank to the north bank at around km 21+700 before the Marelisi Station. The project road starts at the west end with an elevation of around 210 m, with its peak at 950 m at km 45 after Pona village and connects again at E60 in Chumateleti at elevation 720 m. From west to east the road traverses primarily rural and agricultural setting, with the main urban town of Kharagauli at km 11. The railway also provides transport service to the area with stations located in Dzirula, Lashe, Khandebi, Kharagauli, Sagandzile, Didvake, Marelisi, Vakhani Tshakali, Babi, Moliti, Bezhatubani, Tsips, and Gvirabi, after which the railway enters a long tunnel and exits at Mtchedlishviledi in Sative. The map of the project road is shown in the following page.

Figure 1: Location Map of the Project Road



Source: The Consultant.



## **2. Major Components and Design Features**

83. The details of the proposed road project are:

- Rehabilitate and pave the project road from Dzirula to Chumateleti according to Georgian National Standard for Public Motor Roads (SST Gzebi 2009), Geometrical and Structural Requirements with 40 km/h design speed. The pavement within Kharagauli town may remain as it is now, since this is still in fair to good pavement condition.
- Replace or repair of 19 bridges and 149 culverts.
- Construction of side drains and other drainage structures.
- Provision of retaining walls and river protection measures, where necessary.
- Provision of adequate road signing and marking.
- Provision of safety barriers.

### **2.1 Application of Geometrical Design Standards**

84. In 2009 a new Georgian geometric design standard has been introduced,<sup>4</sup> which defines the geometrical standard parameter used in the road design. Based on the selected design speed, appropriate values for the geometrical elements that form the road can be defined. This includes the road cross section, desired horizontal alignment and vertical alignment design parameter.

85. The application of design standards for a rehabilitation project is usual inherently different from a new construction project, especially considering that the project roads are expected to follow the existing road alignments. Following the existing alignment means that perhaps due to existing circumstances the minimum desired design parameter could not been always achieved, respectively the adherence to the standard would result in exceptional high construction costs. It is widespread practice that in these cases departures from the standards are considered and the existing design elements are maintained at their existing values, with the possible exception of limited improvements to eliminate safety hazards.

86. The proposed design values of the geometric design standards are usually intended to provide guidance for the design rather than to be considered as rigid minima. It should be realized that information and values presented in the design guidelines is considered as a 'design standard', but more appropriately described as good engineering practice that should be strived to achieve. But the justification for construction of a particular road will always be based on a detailed technical and economic appraisal, and relaxations of standards may be essential in order to achieve an acceptable level of return on investment.

87. Therefore, the preliminary road design was carried out considering following design philosophy:

- The standards to be applied will follow the Georgian geometric design standard for the selected design speed of 40 km/h, with some flexibility in application when the strict application of the standards would result in an excessively costly technical solution.

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<sup>4</sup> Geometrical and Structural Requirements for Georgian Automobile Roads, Ministry of Regional Development and Infrastructure, Roads Department, Tbilisi 2009.



- In general the design follows the existing alignment wherever possible and considers the existing structures. Where the existing alignment does not correspond to the proposed parameters, certain improvements depending on topography, build-up areas and structures are considered.
- The vertical alignment has been maintained in general, with improvements to the sight distances, where the existing topography allow for improvements. To accommodate new pavement layers, the road elevations have increased accordingly where possible.
- The design will result in a cost effective construction, considering the low traffic volumes on the road and the economic viability of the design.

## **2.2 Alignment Alternatives and Departure from Standard**

88. Since the existing road was not constructed to the design parameter for this design speed, a departure from standard was observed at about 40 locations. A joint site visit with representatives of the Roads Department took place to assess in particular the design alternatives in the field where the alignment is not matching to the desired design parameter.

89. As one of the results of the field visit it was in general agreed that due to the mountainous character of the terrain the minimum horizontal radius could be reduced to 35 m. A reduction of the cross section width to minimise earthworks was not supported, since it would reduce the verge width which are needed to protect the traffic from stone fall of the adjacent slopes. Omitting the verge might create a safety hazard due to falling rocks.

90. During the field visit an agreement with the Roads Department was reached on the design parameter for the critical locations, where the desired minimum parameter in accordance to the Georgian design standard could not be maintained. The agreed solutions at the critical locations are shown in the Table 20 of the Feasibility Study.

91. Regrading the selected design standards the choice was guided by the following considerations.

92. To reflect the rural, mountainous characteristics of the road, the design speed has been set as 40 km/h, which was considered as appropriate for the context and intent of the project. The design speed of the facility will not only influence the operation of the road, but impact the physical features of the road. The main determinants of the standard for the desired road category are summarized in the ensuing subsections.

## **2.3 Standard Road Cross section**

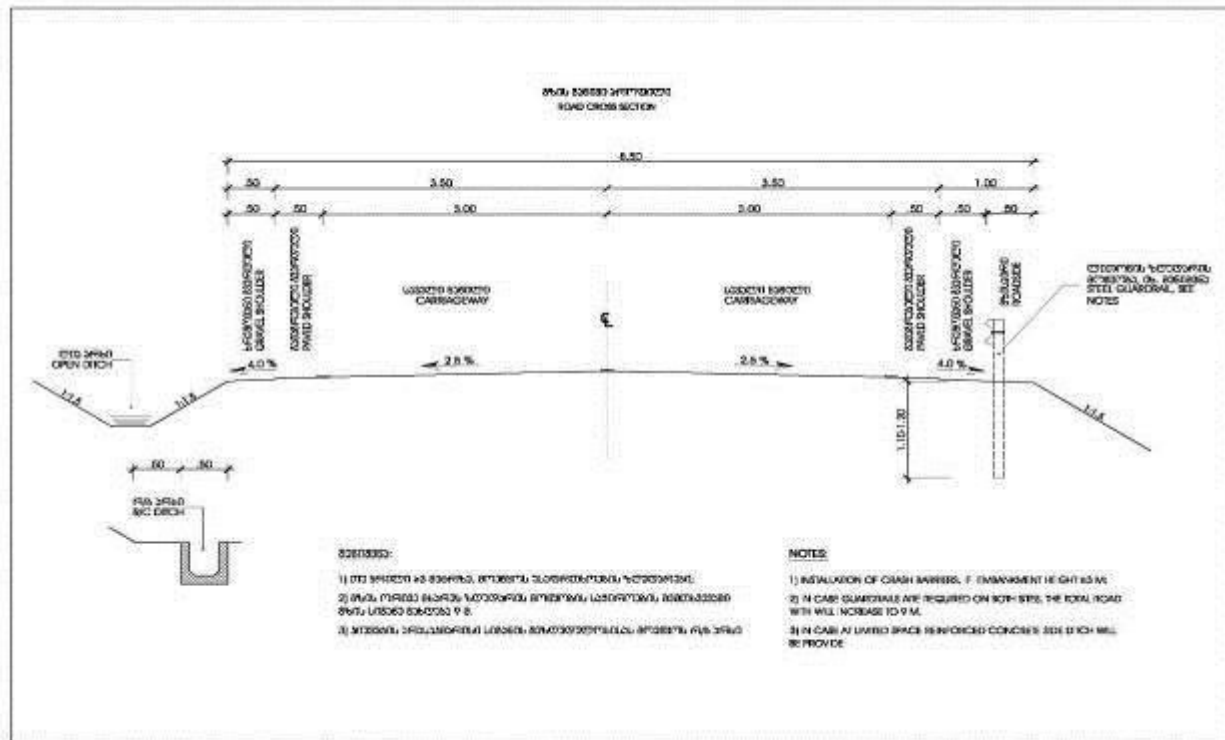
93. The road is to be designed according to Georgian geometric design standard, and accordingly, it shall be sufficient to carry the traffic loading efficiently and with the vehicles from the opposite directions can pass safely. Effectively, these will be a two-lane road consisting of a carriageway width (sum of the width of lanes) and the width of the shoulders. The design elements for the cross section of the project road are as follows:

- |                      |                                   |
|----------------------|-----------------------------------|
| • Number of lanes:   | 2                                 |
| • Lane width:        | 3.00 m                            |
| • Carriageway width: | 6.00 m                            |
| • Width of shoulder: | 1.00 m (of which 0.50 m is paved) |

- Increase of shoulder on embankment 0.50 m
- Total road width: 9.00 m

94. The proposed typical cross section is shown in the figure below.

**Figure 2: Typical Road Cross-section**



Source: The Consultant.

95. It is essential that adequate provision is made for road drainage to ensure that a road pavement performs satisfactorily. Therefore in cuts, water from the upstream area will be collected in an open channel located at the foot of the cut. As the space between the foot of the cut and the road is limited in most of the cases, the channel will be of concrete with a rectangular cross section. The drainage of the subsurface will be directed towards the downstream side of the cut.

## 2.4 Horizontal and Vertical Alignment Parameters

96. The horizontal and vertical curvatures shall be designed to produce in a smooth driving alignment for vehicular traffic. To enable this in the project road, the terrain, traffic volume and the anticipated speed must be considered when establishing the minimum horizontal curvature. Establishing the design speed to be 40 kph, the desired geometrical design parameters are as follows:

- Min. horizontal radius: 65 m
- Max. vertical slope (gradient): 8%
- Min vertical slope: 0.4%
- Min. crest curve: 400 m
- Min. sag curve: 850 m

- Min cross section slope: 2.5%
- Max superelevation: 7%

## 2.5 Carriageway Widening and Transition Curves

97. In curves, for the wheels of large and long vehicles to stay within the pavement, the pavement width will be widened. It is for this reason that the carriageway at low radius curves is widened, to allow for necessary tolerances in lateral location as vehicles turns for a curved path. The carriageway widening is provided for horizontal curves with a radius of less than 1,000m and is designed on the basis of large vehicle. The recommended widening amount in accordance with the Georgian Design standard is shown below:

**Table 4: The recommended Carriageway Widening**

Radius (m)	1,000	850	650	575	425	325	225	140	95	80	70	60	50	40	30
Widening (m)	0.4	0.4	0.5	0.6	0.7	0.8	0.9	1.2	1.4	1.5	1.6	1.7	1.8	2.0	2.2

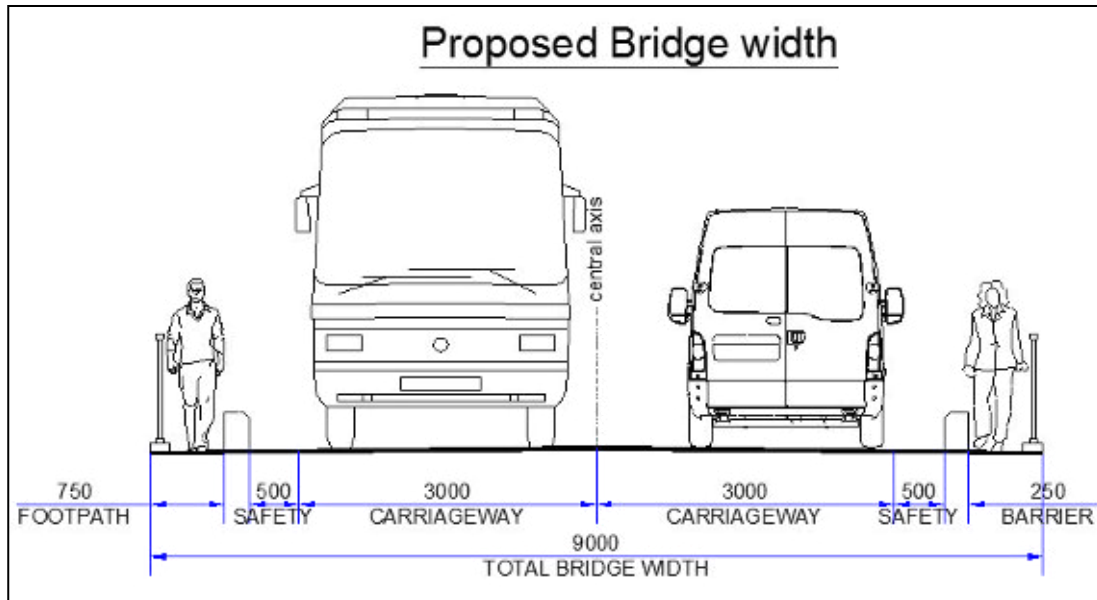
Source: The Consultant.

98. In other cases, like in simple curves, widening is applied over the superelevation runoff length and entirely in the inner edge of the curve. In transition curves, the widening runoff is applied over the transition length. In all cases, the guiding line marking should be placed half way between the edges of the widened carriageway. For the project road preliminary designs, transition curves were introduced between straight alignment sections and circular curves or between two circular curves of significantly different radii to reduce the abrupt introduction of lateral acceleration.

## 3. Bridges and Culverts

99. There are nineteen (19) bridges along the project road, of which three (3) are more than 15 m and four (4) of which have multi-span decks. All of these bridges were inspected and evaluated and out of which only two (Bridge No. 8 at km 21+580 and Bridge No. 9 at km 22+745) were deemed in serviceable condition and thus can be retained. The rest of the bridges were being recommended for replacement. In addition, two (2) new bridges (Bridge Nos. 13.1 and 13.2) are being proposed due to improvement of road alignment to conform to the road design parameters. A typical bridge cross-section and Table for bridges are shown below.

**Figure 3: Typical Bridge Cross-section**



Source: The Consultant.

**Table 5: List of Bridges with Proposed Works**

Sl.	Chainage, km	Year of Construction <sup>1</sup>	Crossing	Superstructure			Condition	Preliminary Remarks
				Total Length, m	Material	Structural System		
1	2+512.000	1975	Riv. GOROULA	11	RCC	Simply Supported Precast Beams	Fair	Main bearing elements may remain in service subject to further evaluation.
2	9+592.000	1961	Riv. OKISHURA	4.9	RCC	Simply Supported In-situ Slab	Fair	Approach embankment and protection to be renovated Bridge accessories/furniture to be retained/replaced. Bridge Recommended for Replacement
3	11+654.000	1959	River JIKHVELI	11	RCC	Simply Supported Continuous In-situ Slab	Fair	The bridge is recommended for replacement
4	12+147.000	1962	Riv. RAKHIELA	8.5	Steel-RCC	Simply Supported Steel-RCC composite slab	Poor	The bridge is recommended for replacement
5	14+860.000	1978	Riv. JONJOULA	17	RCC	Simply Supported Precast Beams	Fair	Main bearing elements may remain in service subject to further evaluation.
6	17+790.000	1979	Riv. RUTIGELE	6.6	RCC	Simply Supported In-situ Slab	Fair	Approach embankment and protection to be renovated Bridge accessories/furniture to be retained/replaced. Bridge Recommended for Replacement
7	19+575.000	1980	Riv. LEGVANI	14.6	RCC	Simply Supported Precast Beams	Poor	The bridge is recommended for replacement
8	21+683.000	1990	Riv. CHKHERIMELA	48	RCC	Simply Supported Post Tensioned Girders of precast I-shape segments	Fair	Main bearing elements may remain in service subjected to further evaluation. Approach embankment and protection to be renovated Bridge accessories/furniture to be retained/replaced.
9	22+855.000	1970	Railway	63	RCC	Simply Supported Precast Beams	Good	Newly renovated
10	25+870.000	1966	Riv. CHARTALI	6.6	RCC	Simply Supported In-situ Slab	Poor	The bridge is recommended for replacement
11	27+085.000	1966	Riv. MOLITISTSKALI	6.6	RCC	Simply Supported In-situ Slab	Poor	
12	29+014.000	1964	Riv. BAKHISTSKALI	6.6	RCC	Simply Supported In-situ Slab	Fair	Main bearing elements may remain in service subject to further evaluation.
13	31+507.000	1975	Riv. BLISKHEVI	15.6	RCC	Simply Supported Precast Beams	Fair	Approach embankment and protection to be renovated Bridge accessories/furniture to be retained/replaced. Recommended for Replacement
13-1	31+578.000	Future	Riv. CHKHERIMELA	30	RCC	Simply Supported Precast Beams	New	New Bridge to be Constructed for alignment Improvement
13-2	31+720.000	Future	Riv. CHKHERIMELA	30	RCC	Simply Supported Precast Beams	New	New Bridge to be Constructed for alignment Improvement
14	33+192.000	1966	Nameless Waterway	4.4	RCC	Simply Supported In-situ Slab	Poor	These bridges are recommended for replacement
15	35+967.000	1967	Riv. TORDZELISTSKALI	7	RCC	Simply Supported In-situ Slab	Poor	
16	38+108.000	1966	Riv. SAKIRIISTSKALI	3.8	RCC	Simply Supported In-situ Slab	Poor	
17	41+110.000	1966	Nameless Waterway	8.2	RCC	Masonry Arch	Poor	
18	43+425.000	1961	Nameless Waterway	7.5	RCC	Simply Supported In-situ Slab	Poor	
19	50+322.000	1972	Riv. SURAMULA	10	RCC	Simply Supported In-situ Beam-Slab	Poor	

100. The drainage structures along the project road were inspected and records were taken for the following characteristics:

- Type of culvert (small bridge, pipe, box, arch);
- Geometrical data (length, height, width, diameter, etc.);
- General structural condition of barrel, headwalls, wing walls, and inlet/outlet structures;
- General hydraulic condition;
- Design and finalization of different types of roadside channels;
- Location and necessity for new culverts.

101. For culverts that can be accessed, along with the results of topographical survey, a detailed inventory sketch was produced. On the project road a total of 149 culverts were assessed. Generally, structural condition of most of the existing culverts is considered poor. No maintenance works, such as clearing of vegetation, rocks and debris were performed. Almost all culverts are not fully operating, due to complete blockages, obstacles in the flow path or due to collapse. All culverts were originally constructed exclusively for drainage purpose. But in some culverts utility lines were made to traverse through them. At some of entrances water main pipeline is attached to the headwall at culvert opening.

102. The following is the summary of the culvert inspection and assessment:

- (i) Out of one hundred forty-nine (149) culverts, one hundred thirty (130) needs to be replaced totally, due to the structurally reasons;
- (ii) Only eleven (11) culverts can be considered as structurally sound needing only inlet and outlet structures;
- (iii) Three (3) culvert inlet / outlet structures are in a good condition, but requires repair work on the pipes;
- (iv) The remaining eight (8) culverts are in a good condition and will not in need any rehabilitation measures.

#### **4. Temporary Ancillary Facilities**

##### **4.1 Material Sources and Cut & Fill**

103. Considerable volume of materials will be obtained from borrow areas and will be used for construction of bridge approach roads. Several potential borrow areas are quite apparent in the general vicinity. Contractors involved in the recent road reconstruction works also can readily identify potential areas for borrow materials which can be used for the bridge approach roads. The prospective contractor will probably identify his own source of materials. However, the materials need to be approved by the construction supervision engineer prior to using them for the project. It is recommended that material is sourced exclusively from existing quarries that have a valid licence.

104. Should the Contractor be sourcing the materials from existing and operational quarry site, the contractor should exert influence on the operator that proper operational and management measures be instituted to minimize impacts to the general environment. On the other hand, should the Contractor decide to open a new borrow site, the guidelines below should be followed in order to minimize impacts associated with the operation of borrow areas:

- All of the required environmental approvals should be secured and extraction and rehabilitation activities consistent with the requirements of MENR and/or permit conditions be carried out;
- Prior to operation of the borrow areas, the contractor should submit to ESS and construction supervision consultant (CSC) the following:
  - 1) A plan indicating the location of the proposed extraction site as well as rehabilitation measures to be implemented for the borrow areas and access roads upon project completion;
  - 2) A dust management plan which shall include schedule for spraying water on access road and schedule of the equipment to be used;
  - 3) A schedule of regular dust suppression on all unpaved access roads during the construction period, particularly in sections where sensitive receptors, such as settlements, are located;
  - 4) Location map of stockpiles which should be away from watercourses to avoid obstruction of flow and siltation;
  - 5) Cover on haul trucks to minimize dust emission and material spillage;
  - 6) Plan to undertake regular maintenance and repair of access roads to their original condition whenever necessary

105. During the field investigations by the geotechnical specialist suitable construction material were located and inspected. In addition, gathered data and information from previous studies relevant to the present project roads concerning construction materials were evaluated. The information obtained from geological maps and available reports were utilized to locate existing and potential quarries and borrow sites. Subsequently, the existing borrow areas have been located in the region which are near or in reasonable distance to the project road are as shown below:

**Table 6: Existing Borrow Areas**

#	Existing borrow areas /quarries	License No.	UsableQuantity (m <sup>3</sup> )	Material
1	Qveda Tseva	100834	3 000	Sand-Gravel
2	Qveda Tseva	100109	32 000	Sand-Gravel
3				Sand-Gravel
4				Sand-Gravel
5	Marelisi		700,000	Limestone
6	Moliti		3,800,000	Limestone
7	Tsipi, km40		68,000,000	Diorite
8	Chumateleti		26,000,000	Granite
9	Khashuri	1001169	28,000	Sand-Gravel
10	Khashuri	100397	180,000	Sand-Gravel

Source: The Consultant.

106. Along the road alignment at around km 17 within the flood plain of Chkherimela River, a crusher plant was erected utilizing materials from the river. This plant supplies material for the railway construction. The river materials are normally regarded as suitable materials for road construction and thus, the project can source material from the operator of this plant. In case the contractor intends to use this plant as a material source it has to make sure that all necessary environmental permits are existing. Alternatively, any winning Contractor can opt to erect his own crusher and generate its own source. Following necessary environmental guidelines and procedures of permitting agency, the Contractor can similarly erect his temporary crushing facilities in areas adjacent to Chkherimela River.

107. For fill materials, computations show that there will be more cut volumes than required volumes for fill; hence, it may turn out that the Contractor may not need any borrow pit at all. Fill materials may be required to raise the embankment at some points, approaches to bridges, backfill at bridge abutments, and other areas that would need leveling. Cut materials to be utilized as fills should be pre-approved by the Engineer. The estimated quantities for cut and fill are shown below:

**Table 7: Existing Borrow Areas**

No	From	To	Volumes (m3)		
			Cut	Fill	Excess
1	0+000.000	5+000.000	79,561.82	11,261.61	68,300.21
2	5+000.000	10+000.000	64,366.76	6,692.02	57,674.74
3	10+000.000	15+000.000	187,611.71	3,334.01	184,277.70
4	15+000.000	20+000.000	29,763.78	9,523.55	20,240.23
5	20+000.000	25+000.000	92,367.58	8,245.64	84,121.94
6	25+000.000	30+000.000	205,555.77	11,542.11	194,013.66
7	30+000.000	35+000.000	114,381.90	23,252.08	91,129.82
8	35+000.000	40+000.000	166,872.30	11,707.35	155,164.95
9	40+000.000	45+000.000	274,657.61	8,463.58	266,194.03
10	45+000.000	50+000.000	56,189.45	15,011.63	41,177.82
11	50+000.000	50+404.729	470.42	497.77	(27.35)
<b>Total</b>			<b>1,271,799.10</b>	<b>109,531.35</b>	<b>1,162,267.75</b>

108. As shown there are three segments where there are high volume of excess materials from cuts to give way to wider roadway and these are at km 10-15, km 25-30, km 35-45 and km 40-45. Overall the estimated excess material is over 1million cubic meters.

109. The excess cut materials would be an issue during the construction especially if locations for their deposition will not be readily available. It will be up to the Contractor to find suitable deposition of these materials to form permanent stockpiles. This can be in private lands, as landowners may choose to have their lots be filled for their own purposes, for improvement of access or rural roads; or to government land. These stockpile areas should be configured in such a way as they do not cause stability issues or deposition or slide into the river. In addition, the Contractor should obtain written permission for the rightful private owners or from concerned government agencies in case of government lands. Rock materials can be used to fortify river banks, road embankment slopes and can be used as toe protection of other structures.

110. For excess cut materials, a number of possible locations were identified during one site visits as follows and can be investigated by the Contractor:

**Table 8: Possible Stockpile Areas for Excess Soil from Cuts**

Location	Description
Km 7+250	This is currently unused agricultural land with elevations lower than that of the road, and located at the left-hand-side of the road. Filling this area would be beneficial to the owner as his property will be at the same elevation with the road. The river runs on the northern side and there can be risk of silt run-off if not done properly. Stone armor should be provided at the slope of the proposed fill (Estimates: Area = 1.5 Ha.; Height = 4 m; Volume = 60,000 m3)
Km 9+750	Currently being used also as stockpile area of unused soil located around 200 meters on the



Location	Description
	right-hand-side of the road. A borrow pit is located 200 meters on the north of this location and can also be used as stockpile area. No adverse impact to the environment if this will be used as stockpile area. (Estimates: Area = 3 Ha.; Height = 4 m; Volume = 120,000 m3)
Km 30+250	Currently unused agricultural land with elevation lower than the road, located at the right-hand-side of the road. Filling this area would be beneficial to the owner as his property will be at the same elevation with the road. The river runs on the southern side and there can be risk of silt run-off if not done properly. Stone armor should be provided at the slope of the proposed fill. (Estimates: Area = 1.5 Ha.; Height = 4 m; Volume = 60,000 m3)
Km 31+350	The area is on the right-hand-side of the road and along side the river. As observed, there can be risk of silt run-off if not done properly. Stone armor should be provided at the slope of the proposed fill. (Estimates: Area = 5 Ha.; Height = 4 m; Volume = 200,000 m3)
Km 38+428	The area is on the right-hand-side of the road and in a clearing and sparsely vegetated area. It is sloping downward to the east. One issue is that this is under power transmission line. However, the area seems suitable for filling. The river is quite far in this area. (Estimates: Area = 3 Ha.; Height = 4 m; Volume = 120,000 m3)
Km 39+138	The area is on the right-hand-side of the road and currently unused agricultural area. Filling this area would be beneficial to the owner as his property will be at the same elevation with the road. The river below is around 200 meters at the southern side and is sloping downward to the south. (Estimates: Area = 10 Ha.; Height = 4 m; Volume = 400,000 m3)
Km 44+45	Adequate areas can be found here for stockpile. This is the plateau summit of the project road and with considerable flat space with adequate hectarage for filling. These are all private properties but filling in this area can be acceptable to the owners. (Estimates: Area = 10 Ha.; Height = 4 m; Volume = 400,000 m3)

Source: The Consultant.

111. The total capacity to accept fill materials for the locations identified was estimated is around 1.3M cubic-meters, while the excess materials to be deposited was estimated to be 1.27M cubic-meters. This indicates that the areas identified would be sufficient to accept the excess materials from the cut. Similar spots can also be found during the construction phase and can also be utilized as dumping areas. Other dumping probable dumping area for boulders are the banks of river for which they can serve as bank protection materials. In addition, owners of lots along the road would opt to have their properties attain the road level for their personal usage. Hence, it is expected that the excess materials will not pose as major issues. The final deposition sites for surplus material will however be determined within the frame of the Spoil Management Plan which is included in the Site Specific EMP and prepared by the contractor.

## 4.2 Asphalt and Cement Batching Plants

112. In establishing asphalt plant at the site for the road pavement basically the binder course and the surface course; the Contractor should be guided by a number of items to protect the environment. Emissions will be produced in producing the asphalt mix likewise bitumen spill may occur during handling and mix preparation.

113. Asphalt plants have two major categories of emissions: ducted sources (those vented to the atmosphere through some type of stack, vent, or pipe), and fugitive sources (those not confined to ducts and vents but emitted directly from the source to the ambient air). Ducted emissions are usually collected and transported by an industrial ventilation system having one or more fans or air movers, eventually to be emitted to the atmosphere through some type of stack. Fugitive emissions result from process and open sources and consist of a combination of gaseous pollutants and PM.

114. The most significant ducted source of emissions of most pollutants from asphalt plants is the rotary drum dryer. The dryer emissions consist of water (as steam evaporated from the aggregate); PM; products of combustion (carbon dioxide [CO<sub>2</sub>], nitrogen oxides [NO<sub>x</sub>], and sulfur oxides [SO<sub>x</sub>]); carbon monoxide (CO); and small amounts of organic compounds of various species (including volatile organic compounds [VOC], methane [CH<sub>4</sub>], and hazardous air pollutants [HAP]). The CO and organic compound emissions result from incomplete combustion of the fuel.

115. Modern asphalt plants have however very low emission rates and noticeable emissions are usually water steam from the drying of aggregates at hot temperatures. In order to avoid any significant impacts due to emissions only properly licensed facilities with valid environmental permits shall be used. In addition regular monitoring of dust, SO<sub>2</sub>, NO<sub>x</sub> and CO is conducted during operation of the asphalt plant as indicated in the monitoring programme.

116. For the cement batching plant for concreting works such as bridges, culverts and drainage works, cement dust can contaminate the air. In addition, the preparation, mixing and loading of concrete mix into the transit mixer and subsequent washing of trucks will result into soil and water contamination. For the cement batching plants there shall be regular monitoring of dust emissions.

117. Asphalt plant and cement batching plant will be situated at appropriate distances from the residences as well as the river so as not to result in any impacts on communities or water contamination. Within the project road, since the area is rural, there are ample spaces to set up these plants. The Contractor must obtain the necessary permits, negotiate properly with the landowners and reinstate the area after usage at the end of the project.

### **4.3 Construction Camp**

118. The proper maintenance of all the service and sanitary facilities at the construction camp falls under the direct responsibility of the Contractor under the supervision of the construction supervision engineer for the project. The sanitary facilities or ablution include toilets, urinals, showers, washstands and a laundry area. In addition, equipment and maintenance yard will also have to be sited accordingly. Waste water should not be discharged into the river unless treated in compliance to local effluent standards.

119. The camp site should be located nearby the Project road in order to minimize transport distances during construction phase. This also avoids any impacts on protected areas because no such area is abutting the Project road. In order to avoid impacts on natural forests a minimum of 10 bufferzone shall be established to the forest edge.

120. The Contractor shall ensure that construction camp and ancillary facilities are provided with adequate amounts, and the required quality, of drinking water which do not compete with the local population's need. The Contractor is going to identify suitable source of water supply which need to comply with Georgian drinking water standards (Technical Regulation on "Drinking Water", approved by the decree №58 of the Government of Georgia, dated 15.01.2014). To be sure that water is meeting standards of domestic and drinking quality water sample shall be taken for analysis. In case water quality doesn't meet required standards, an alternative source needs to be identified.

121. To avoid contamination of any watercourse with sewage discharged from the Contractor's camp, a sewerage system will be established. Wastewater collected from each

building will pass through a system of preliminary sedimentation chambers. Finally, treated water will be accumulated in big septic tank. The septic tank will be located at a sufficient distance (at least 50 m away) from any water body. The tank will be regularly emptied into cesspool truck, transported from the camp sites and utilized in accordance with Georgian legislation.

122. Technical wastewater, generated as a result of cleaning and washing equipment and trucks, may be contaminated with lubricants and will not be treated together with domestic sewage. It is proposed that the Contractor will construct a system of 3 sedimentation boxes for preliminary treatment of such water. By this treatment all heavy mud and lubricants are accumulated in the first and second boxes, where they will be collected for future disposal as hazardous waste in accordance to the agreement with a licensed waste management contractor. The remaining of treated water from third box can be classified as non-hazardous technical water and could be re-used for dust suppression or road compaction purposes or disposed as described in the above paragraph.

123. Waste and recyclable will be disposed of by the contractor in a controlled manner in accordance with the Georgian legislation and following these general procedures:

- Identification
- Classification
- Correct handling (including bagging if necessary)
- Correct storage/segregation
- Correct disposal/re-use/recycling
- Documentation

124. Where feasible the contractor will arrange the temporary integration of waste collection from work sites into existing waste collection systems and disposal facilities of nearby communities. This shall be taken into consideration when deciding the place for the camp. If this is not possible disposal of waste shall be conducted by an approved company.

## **E. Description of the Environment (Baseline Data)**

### **1. Physical and Biological**

#### **1.1 Topography, Geology and Soils**

125. Local geologist was employed to provide detailed information of the geologic characteristics of the project area. Existing geologic maps of Georgia as well as the project road vicinities were used as basis for the geological study of the area.

126. The broad vicinities of the project road are generally hilly and mountainous, located between Kolkheti and Shida Kartli lowlands and are characterized by higher hypsometric location. This region is surrounded by Caucasus Mountains from the North and by Lesser Caucasus mountains from South and includes basic geomorphologic elements of Georgia.

127. The road follows the meandering route of the river and creeps through narrow passages between river banks and some steep slopes. In a number of locations, the road is at foothills of erodible fractured mountain rocks and erodible hillsides. A large relatively flat to mild slope is found in Kharagauli town where the biggest settlement in the vicinity of road vicinity is situated.

128. The lithology of the area is mainly terrigenous quaternary deposits consisting of elluvial-delluvial-colluvial deposits with surfaces that are widely spread. The alluvial-bed deposits are primarily terrace boulder-and-shingle and sand-sandy-loam fillers while the gorges of some rivers are covered with proluvial-mudflow deposits.

129. As described in the detailed geological report, the area along the road is geologically structured by Cretaceous and Jurassic deposits at South, South-West and North-West peripheries and is represented by conglomerates, sandstones and limestone, but at East and North-East peripheries by argillites and carbonated clays. Thickness of deposits ranges within 50 to 300m; they are basically covered with technogenic (tQIV), eluvial-deluvial (edQIV) and alluvial-proluvial (apQIV) genesis recent deposits. The areas engineering-geological conditions are almost homogeneous, with a wavy-steep surface. Locally at roadsides, rock-fall and side and depth erosions take place. Also, locally areal erosion can develop in varying distance of the road section, which needs to be mitigated in the future.

130. The study road passes on artificially made road foundations from the beginning to the end; structured and constructed with technogenic cobbles with silty sand filling. Embankments are somewhat in a good state along the whole road, damages or slidings of slopes were found in some locations during the field visits.

131. A number of soil samples were obtained from test pits along the road alignment. Results showed that the soils were t generally of technogenic soils, Quaternary lean clays and Cretaceous and Jurassic period deposits. Results indicated the presence of clayey firm and coherent soil with some spots of cohesionless soil. Soil strength ranges from a low of 159kpa to a high of 490kpa.

#### **1.2 Climate**

132. The information on climate condition is based on meteorological station gathered from the Mount Sabueti, Kharagauli, Tsipa and Pona stations. Based on the climate regionalization map of Georgia the region belongs to II climatic and II-b sub-region.

133. The Chkherimela River basin, where the project road is located, is situated on the western slopes of Surami ridge, on the Imereti Plateau. Due to the distance from the Black Sea, the area is more influenced by the surrounding land features. This results to a climate that is dry, with much colder winter than on Kolkheti Valley. The orographic peculiarities of the area promote the altitudinal development specific for the region. The average annual temperature of this region is from 13°C (in Kharagauli, Chiatura) to 6-8°C (Sabueti), with the average temperature of the coldest month ranging from +[2-4]° to -[3-5]°. In the warmest months the temperature varies from [16-18]°C to 23°C, with the annual temperature amplitude of 16-19°C to 20–21°C. The annual rainfall varies from 700-800 mm to 1100-1200 mm, with the minimum value fixed over the north-eastern slope of Likhi ridge (near Chumateleti).

134. Due to the cohesive subgrade condition along the study road sections, the pavement structure is susceptible to the influence of freezing temperatures. Based on the available climatic data and temperature records frost penetration into the subgrade soils may occur. Hence, the frost penetration depth within the pavement has to be considered in the pavement design. Within the road sections the normative depth of soils' seasonal freezing is as follows:

- Clayey and lean clay: 27cm
- Fine and silty sand/silty sand: 32cm
- Coarse and medium grained gravelly sand: 35cm
- Coarse fragmental: 40cm

### **1.3 Hydrology, Water Resources and Water Quality**

135. The study road runs over most of its length in the valley of the Chkherimela River which is one of the main tributaries of the Dzirula River. The Chkherimela River valley is a part of the Rioni river basin which drains west to the Black Sea. The road crosses the Chkherimela River at four points as it heads east to Chumateleti. At the lower reaches downstream, where the Chkherimela River flows into Dzirula River, the road runs parallel to the river until it connects with E-60. The other rivers that flow into Chkherimela River are Goroula, Jikhvela, Jinjoura, Leghvana, and Bliskhevi.

136. Since no water quality data is available for Chkherimela River and Dzirula River, baseline measurements were done in five (5) sampling stations.<sup>5</sup> Station 1 is located at the lower region of the Dzirula River; Stations 2 and 4 were tributaries of Chkherimela River; Station 3 is the mid-reach of the Dzirula-Kharagauli rivers; and Station 5 is the headwaters of Chkherimela River. The water samplings were done on November 13-16, 2014 at these specified locations. These sampling stations present the water quality of the Dzirula-Chkherimela River at the lower, mid-reach, and headwaters. In addition, one major tributary from the south regions at km 9+521 and another from the north regions of the river at km 35+952 were also considered. Generally, the water quality along the river is within the permissible limit with the following observations:

- (i) The COD is high in the headwaters which can be due the presence of human habitations and activities in the area.
- (ii) Turbidity is high in Sta. 4 which can be due to lower observable flow rate and presence of more silt materials in the area, while the rest of the spots have relatively high volumetric flows thus, lowering the concentration levels. Also Sta.

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<sup>5</sup> The instrumental measurements for water quality, air quality and noise was subcontracted to Gamma, a local environmental company.

1 has relatively elevated turbidity as this point receives all the flow from upstream. This parameter will be useful in monitoring turbidity that can be caused by the construction activities, considering the proximity of the road to the river to the project road in several spots.

- (iii) BOD readings seem to fluctuate along the river, but the gross average is still lower than the MPC.

137. The measurement results for water quality on the selected parameters are shown below. The measurements were conducted on November 13–16, 2014 by Gamma laboratory. No newer measurement data are available.

**Table 9: Water Quality Measurement Results**

Aspects\No.		1	2	3	4	5	MPC Georgian National; Standards
Locations		Sta. 1: Dzirula Riv.	Sta. 2: Chkhirimela Riv. Tributary	Sta. 3: Chkhirimela Riv. (middle)	Sta. 4: Chkhirimela Riv. Tributary	Sta. 5 Chkhirimela Riv (Head- waters)	
X		346152.31	350397.79	357464.19	369535.85	374885.87	
Latitude		43° 08' 23.7036" E	43° 11' 34.0026" E	43° 16' 46.2112" E	43° 25' 28.7283" E	43° 29' 19.5666" E	
Y		4660774.00	4654680.84	4648915.4	4651227.20	4653373.86	
Longitude		42° 05' 2.3104" N	42° 01' 47.7996" N	41° 58' 45.6692" N	42° 00' 8.1268" N	42° 01' 20.8315" N	
Km in Road		0+504	9+521	20+145	35+952	43+955	
COD, mg/l		<15	<15	<15	<15	28.7	30,0
BOD 5, mg/l		1.4	2	3.3	1	1.3	6
Turbidity	FTU	10.18	2.75	2.14	38.44	5.48	-
	TSS, mg/l	76.35	20.625	16.05	288.3	41.1	-
Oil & Grease, mg/l		<5.0	<5.0	<5.0	<5.0	<5.0	5.0
TPH	mg/l	<0,04	<0,04	<0,04	<0,04	<0,04	0.3

Note: FTU = Formazin Turbidity Unit; MPC = Maximum Permissible Concentrations. Measurement done on Nov. 13–16, 2014 (by Gamma).

### Justification for Using Georgian National Standards for Water Quality

138. Water bodies are only likely to be affected in the areas where bridges are to be constructed. Not any of these surface waters is used as a drinking water resource. Therefore the Georgian national standards for protection of surface waters are used. The Justification for using GEO national standards for water quality and air quality is that the ADB through the WB/IFC EHS guidelines require that national standards are followed should they exist, where they don't exist international guidelines such as the WHO guidelines are used (the only case where WB/IFC standards/guidelines are to be used, are noise standards). The relevant Georgian standard is the Technical Regulation – "Protection of Surface Water Contamination", approved by the decree No.425 of the Government of Georgia from 13.12.2013.

#### **1.4 Air Quality and Dust**

139. Ambient air quality monitoring is conducted at only seven locations in Georgia, and none of which is located near the project road. No major air polluting industry is located in the study area. The traffic along the road is minimal, but the unpaved area, especially in dry months tends to become dusty. Generally, due to the forested surroundings, the air quality can be considered to be satisfactory.

140. To establish a baseline on Air Quality and Dust, four (4) measurements were done accordingly in selected spots, which are considered sensitive receptors of impacts, especially during construction period.

141. The locations of the sensitive receptors are shown in the Figure below.

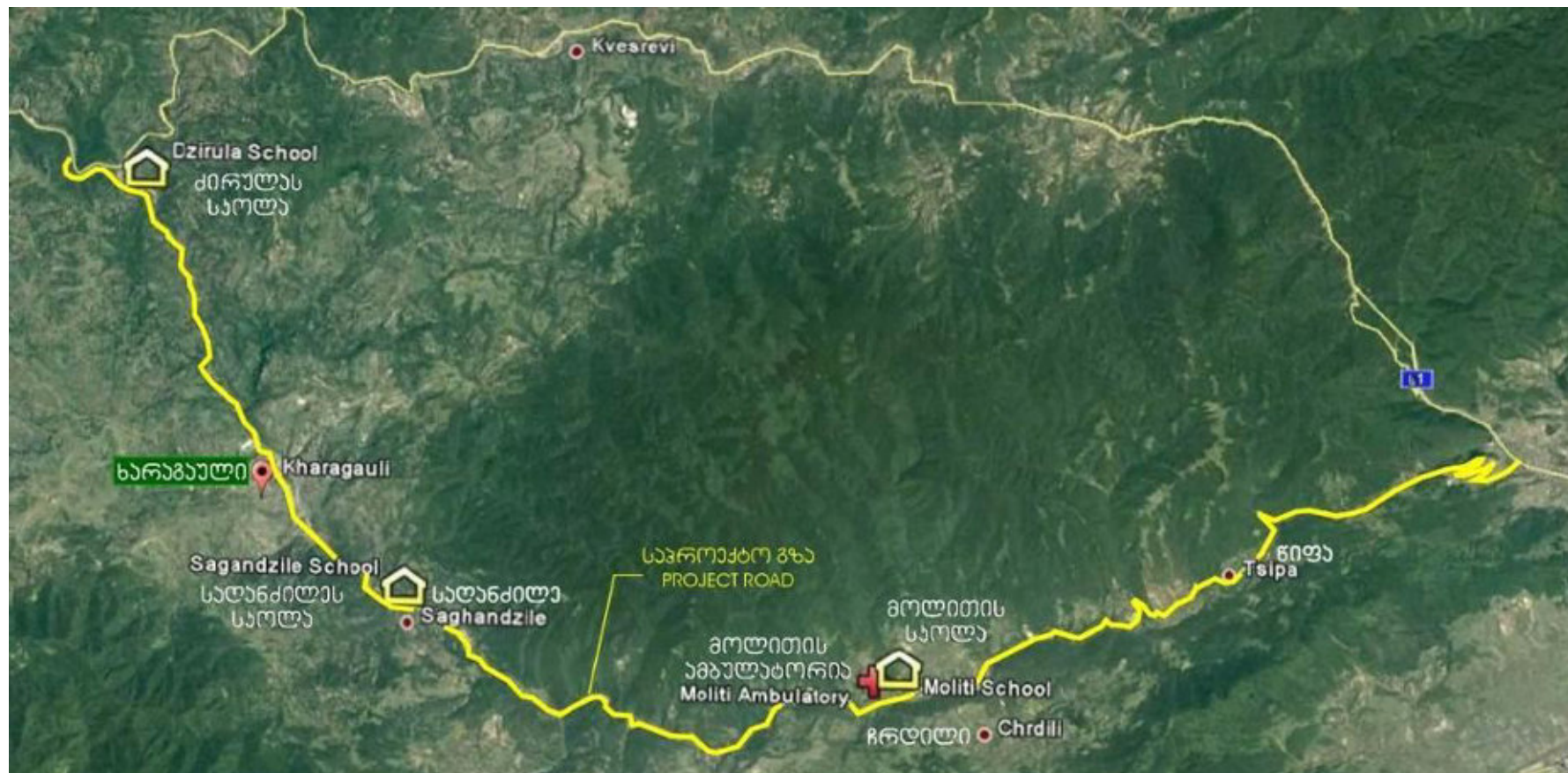


Figure 4: Location of Sensitive Receptors for Air Quality Measurements



142. As expected, the air quality is at good levels prior to any construction activities and due to very few exhausts contributing to emission in the area. The lush vegetation in the area will be a good carbon sink for emissions from any human activity. The air quality results are shown below. The measured values are much below the permissible national environmental standards which are indicated in the bottom line of the table.

**Table 10: Air Quality Measurement Results**

No.	Measurement Point Locations	Coordinates			Air Quality Parameters (mg/m3)		
		X, Y	Latitude	Longitude	CO	SO <sub>2</sub>	NO <sub>2</sub>
1	Dzirula School (km 2+743)	347920, 4660149	43° 09' 41.1894" E	42° 04' 43.2958" N	<1.0	<0.1	<0.1
2	Sighandzile School (km 14+968)	353544, 4651010	43° 13' 54.0605" E	41° 59' 50.9647" N	<1.0	<0.1	<0.1
3	Moliti Ambulatory (km 28+473)	363854, 4648894	43° 21' 23.7805" E	41° 58' 49.0431" N	<1.0	<0.1	<0.1
4	Moliti school (km 29+032)	364379, 4649125	43° 21' 46.3935" E	41° 58' 56.8559" N	<1.0	<0.1	<0.1
Maximum Permissible Levels					<b>5</b>	<b>0.5</b>	<b>0.2</b>

Note: Measurement done on Nov. 13-16, 2014 (by Gamma).

Permissible Levels for SO<sub>2</sub> and NO<sub>2</sub> in accordance to IFC, EHS Guidelines, Air Emissions and Ambient Air Quality.

143. Calculation of air quality at the expected completion year of the rehabilitation (open to traffic in 2018) and after 10 years (2028) are shown in the Table below. The calculation was conducted for the parameters Particulate Matter (PM) and NO<sub>2</sub>. The measured values are much below the maximum permissible levels according to Georgian Standards and the WB/IFC standards. Measurements for PM 2.5 have not been made as the present road has very low traffic flows, even after construction. Therefore the traffic is not likely to contribute to a significant increase in PM2.5 emissions. Hence, Georgian national laws are sufficient for monitoring air quality.

**Table 11: Air Quality Calculation Results**

Road Section	Year	AADT	% Heavy Vehicles	PM <sub>10</sub> (24h average) mg/m3	NO <sub>2</sub> (Annual average) mg/m3
Section A, km 0 – km 2	2018	372	8 %	0.0	0.0
	2028	809	7 %	0.0	0.0001
Section B, km 2 – km 10	2018	1563	6 %	0.0001	0.0002
	2028	3405	5 %	0.0001	0.0004
Section C, km 10 – km 13	No pavement rehabilitation anticipated				
Section D, km 13 – km 30	2018	297	15 %	0.0	0.0
	2028	727	12 %	0.0	0.0001
Section E, km 30 – km 50	2018	379	13 %	0.0	0.0
	2028	931	10 %	0.0	0.0001
Permissible Levels				<b>0.05</b>	<b>0.04</b>

Note: Calculations are carried out by Air Quality Calculator, NZ Transport Agency 2016.

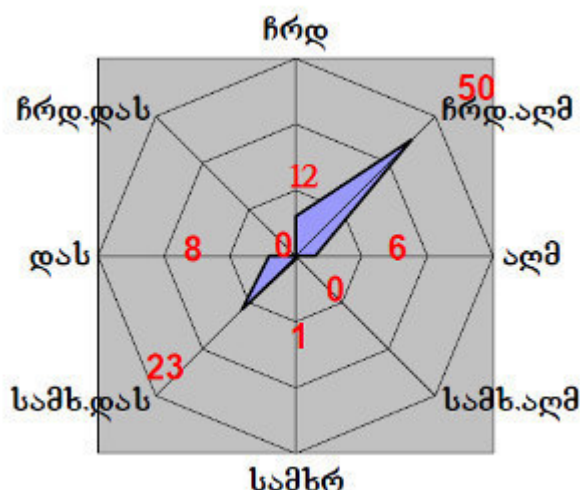
### Justification for Using Georgian National Standards for Air Quality

144. As can be seen in the above data sets, the measured values of air quality parameters

are well within the Georgian national standards as well as the WB/IFC standards. The traffic projections over the next 20 years are not likely to increase the NO<sub>2</sub> levels to any values of significance, therefore, PM<sub>2.5</sub>- an emission that occurs due to high vehicular traffic, is also not likely to be of concern. Therefore, the Georgian national standards for air quality can be used for the purpose of air quality monitoring. The justification for using GEO national standards for water quality and air quality is that the ADB through the WB/IFC EHS guidelines require that national standards are followed should they exist, where they don't exist international guidelines such as the WHO guidelines are used (the only case where WB/IFC standards/guidelines are to be used, are noise standards).

145. The below figure shows the representative wind rose for the study area. Prevailing wind direction is from the North East. Because the air quality parameters are much below the national Standards any exceedance due to wind influence can be excluded.

**Figure 5: Windrose of the Study Area**



146. Due to expected earth moving requirements of the project, one of the expected impacts is the generation of dust. The existing roadway will be considerably disturbed and exposed to air, as well as certain areas such as bridge sites and mountain slopes. Some vegetated areas will be exposed, while cut materials will be stockpiled and will be likewise exposed for sometime. These mentioned areas will be potential sources of dust that can impact receptors along the road.

147. Dust concentration measurements were done in the same four (4) locations where air quality measurements were likewise measured. The results showed that dust concentration in these selected areas indicate good air quality. It is recommended that during the construction, these areas will be specified as dust sampling sites for the Contractor to conduct periodic measurements. The measured dust levels in selected locations are shown in the Table below. The maximum permissible level according to Georgian standards is given in the bottom line.

**Table 12: Dust Measurement Results**

No.	Measurement Point Locations	Coordinates		Date	Time	Dust (TSP) Measured (mg/m3)
		Latitude	Longitude			
1	Dzirula School (km 2+743)	43° 09' 41.1894" E	43° 21' 23.7805" E	13.11.2014	8 <sup>00</sup> -10 <sup>00</sup>	0.19
					16 <sup>00</sup> -18 <sup>00</sup>	0.04
2	Sigbandzile School (km 14+968)	43° 21' 23.7805" E	41° 58' 49.0431" N	16.11.2014	7 <sup>30</sup> -9 <sup>30</sup>	0.06
					17 <sup>00</sup> -19 <sup>00</sup>	0.30
3	Moliti Ambulatory (km 28+473)	43° 21' 23.7805" E	41° 58' 49.0431" N	15.11.2014	7 <sup>00</sup> -9 <sup>00</sup>	0.10
					17 <sup>00</sup> -19 <sup>00</sup>	0.10
4	Moliti school (km 29+032)	43° 21' 23.7805" E	41° 59' 50.9647" N	14.11.2014	8 <sup>00</sup> -10 <sup>00</sup>	0.19
					16 <sup>00</sup> -18 <sup>00</sup>	0.13
	Maximum Permissible Levels					0.5

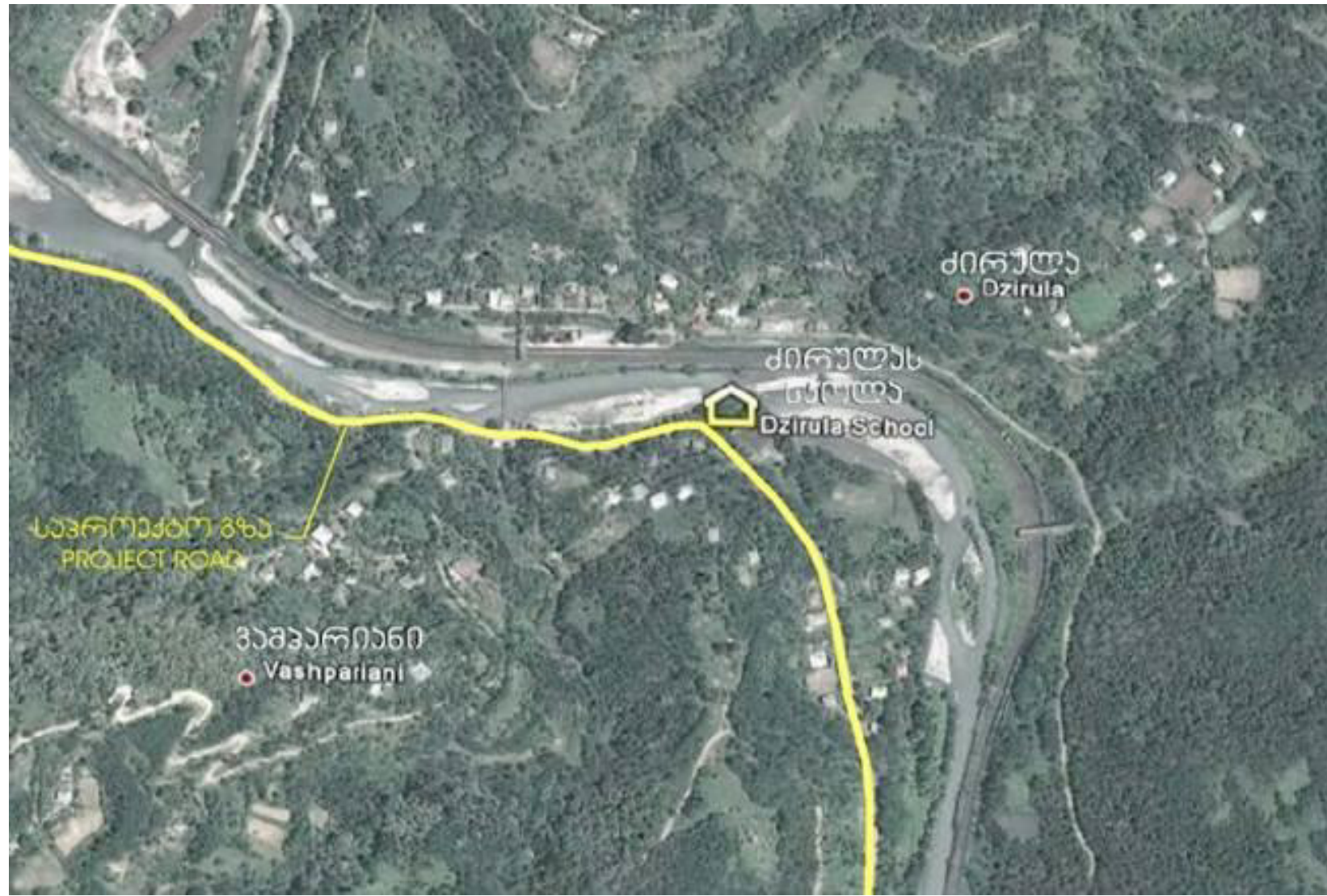
Measurement done on Nov. 11, 2014 (by Gamma).

## 1.5 Noise

148. Ambient noise is not subjected to monitoring in Georgia, so there is no data on ambient noise/vibration available. Main noise generating sources in the towns are transport vehicles, local construction and industrial activities. In the project road, the sources of noise are minimal; hence not considered a concern to the people living in the area.

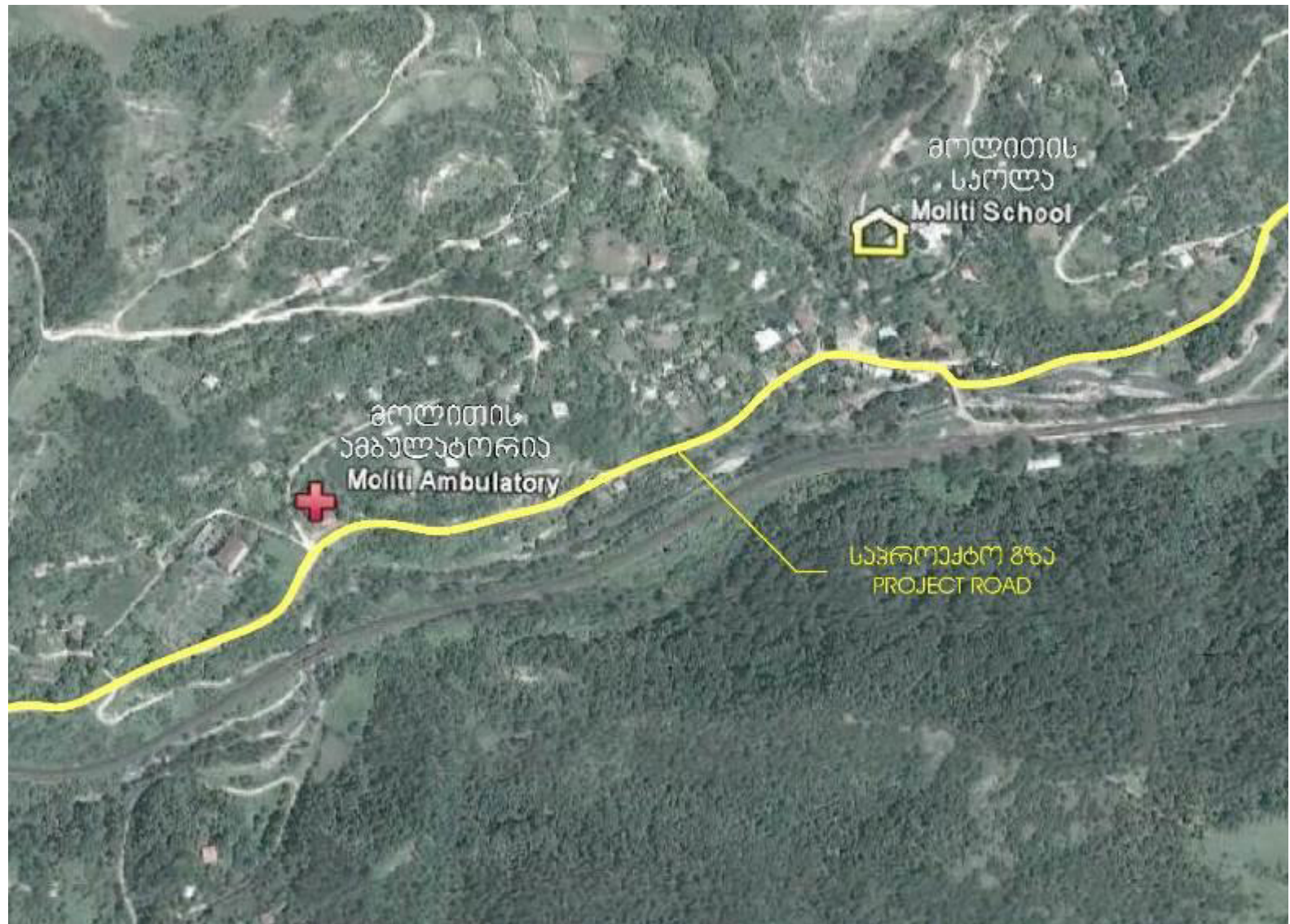
149. To establish ambient noise levels, noise measurements were done in the same four (4) locations where air quality measurements were likewise measured, since these spots were considered the sensitive receptors along the project road. The project road runs for most of its length parallel to a railway line. During noise measurements, the overlapping of the traffic with the railway noise has been recorded separately. The location of the noise measurement is shown below.

Figure 6: Noise Measurement Localities on Aerial Photographs











150. The 8-hour noise average measurements indicate good level of noise with occasional elevated noise levels during the passage of train. The 8-hour measurement duration has been selected based on the traffic distribution over the day and represent the period of the most trafficked time.

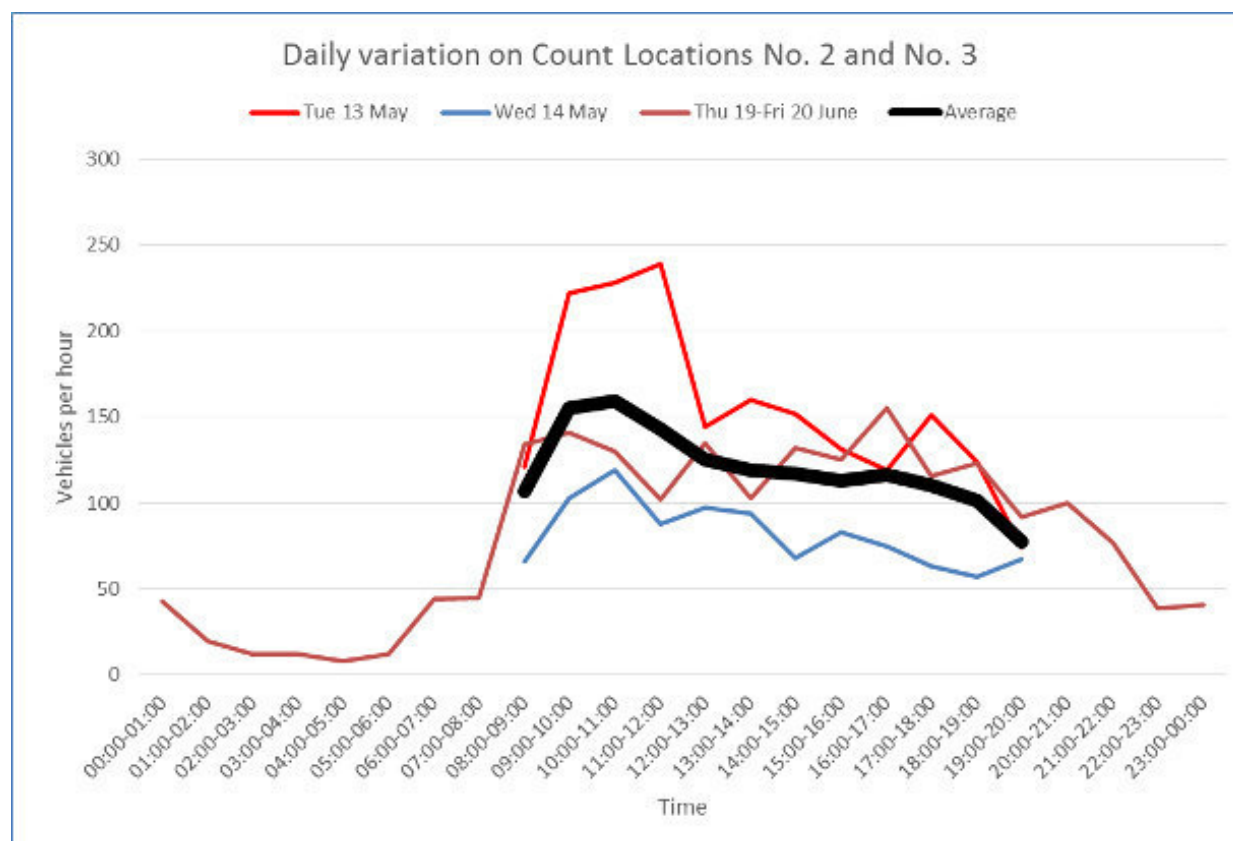


Figure 7: Daily traffic variations

151. During construction, noise will be elevated and the receptors should be protected from excessive noise at all times. The measured noise level is shown in the Table below.

Table 13: Noise Measurement Results

No.	Measurement Points Locations	Coordinates		Noise dB(A)	
		Latitude	Longitude	8-Hour Average	Due to Train
1	Dzirula School	43° 09' 41.1894" E	42° 04' 43.2958" N	50.0	77.5
2	Sighandzile School	43° 13' 54.0605" E	41° 59' 50.9647" N	52.0	72.5
3	Moliti Ambulatory	43° 21' 23.7805" E	41° 58' 49.0431" N	52.2	69.2
4	Moliti school	43° 21' 46.3935" E	41° 58' 56.8559" N	50.3	60.9
Maximum Permissible Levels				55	

Note: Measurement done on Nov. 11, 2014 (by Gamma).

Permissible levels in accordance to World Bank Environment, Health and Safety Guidelines, for residential, institutional and educational receptors: Daytime (07:00 – 22:00) – 55 dBa; Nighttime (22:00 – 07:00) – 45 dBa.

152. The project contains mainly rehabilitation of the existing road. No major realignment or implementation of an additional traffic lane is envisaged and therefore no entitlement for noise protection or compensation exists in accordance to Georgian laws and regulation. However, in

order to estimate the magnitude of the noise impact on the adjacent properties, noise calculations for the year of opening of the rehabilitated road (2018) and in 10 years time has been performed. The calculation results are shown in the Table below and concerns an area within 25 meters from the road centerline. Because of the absence of applicable Georgian noise regulations noise needs to be monitored against WB/IFC standards which are 55dB(A) day and 45dB(A) night time. The noise calculation in below table shows that the standards are met. There is only a slight exceedance in section B for the year 2028. In case of any complaints the noise level in the relevant section should be monitored.

**Table 14: Noise Calculation Results**

Road Section	Year	AADT	Percentage of Heavy Vehicles	Daytime Noise level dB(A)	Nighttime Noise level dB(A)
Section A, km 0 – km 2	2018	372	8 %	46	35
	2028	809	7 %	52	44
Section B, km 2 – km 10	2018	1563	6 %	54	45
	2028	3405	5 %	57	49
Section C, km 10 – km 13	No pavement rehabilitation anticipated				
Section D, km 13 – km 30	2018	297	15 %	49	41
	2028	727	12 %	52	53
Section E, km 30 – km 50	2018	379	13 %	49	41
	2028	931	10 %	52	44
Permissible Levels				<b>55</b>	<b>45</b>

Note: Calculations are carried out with the Road Traffic Noise Calculator (<https://rigolett.home.xs4all.nl/ENGELS/vlqcalc.htm>)

AADT were converted to vehicle by hours.

153. The comparison of the existing noise levels and the calculation results shows that after opening of the road a slight decrease in noise levels are expected due to better surface conditions, which will be offset in approximately 10 years due to the expected traffic increase.

## 1.6 Geo-Hazards and Risks

154. Geo-hazards are either natural or man-made geological and environmental conditions that can cause or expose people, properties, infrastructure, and environment to potential harm, injury, disruptions, and destruction. For the project road the potential geo-hazards consist of river bank and road edge erosion, slope failure leading to landslide or mudslide, rock/stone fall, and snow avalanche in winter, to name a few. Generally, a hazard is defined by three parameters: a level of hazard (severity), its occurrence frequency, and location.

155. Risk can be defined as the probability (chance) of harm or adverse impact to people and environment due to exposure or presence of a hazard. A risk is defined by four parameters: a probability, level of severity, time period, and location. For the road project, certain spots or locations have high probability of rock-fall on vehicles, which can result to vehicular damage or injury (or fatality) to motorist during rainy period.

156. One of the objectives of the road project with the necessary works would be to mitigate hazards to prevent them from happening and minimize the risks to motorist, local people and immediate vicinities. This is more important during the operational phase of the road since more and more people will be using it and thus road safety concerns should be given due considerations.



## 1.7 Biological Environment

157. Georgia, with its rich biodiversity, is located in the southern Caucasus, which is recognized as one of the world's 25 biodiversity hot spots. Georgia's flora and fauna are also characterized by a high degree of endemic, sub-endemic and relict species. According to the actual biodiversity index (ABI) and the average biodiversity index (BDI), Georgia ranks first in Europe and 36th in the world in terms of biodiversity.

158. The project road is partly within the “Humid subtropical areas of Kolkheti lowland” and partly crossing the “Humid mountain forests of western Georgia” as shown in the bio-geographical regions in Georgia below.



**Figure 8: Bio-geographic Regions of Georgia**

159. In Georgia, the forest lands constitute about 40 per cent of the total geographical area of the country. The average forests density of is 163 m<sup>2</sup> per Ha., with 97 per cent of forests located in mountain regions, while the remaining 3% are low-lying and flood plain forest mainly found in Kolkheti Region and in Western Georgia.

### 1.7.1 Flora

160. In Georgia the large diversity in plant species and plant communities in the region is caused by the three bio-geographic regions converging in the BKNP, which is south and adjacent to the project road, namely the Colchic and Eastern Caucasian, the Small Asian (Anatolian) and the Front Asian (Iranian). In the area Tertiary Colchic, relics and endemics

(*Rhododendron ponticum*, *Laurocerasus officinalis*, *Staphylea colchica*, etc.) are found, as well as rare representatives of flora typical for the south of Georgia (*Celtis caucasica*, *Papaver pseudoorientalis*, etc.).

161. The endemic typical floral species in the area are the *Gladiolus dzavacheticus* and *Corydallis erdelii*. The flora of the region includes over 2000 flowering plants. The BKNP is known for the greatest concentration in the Caucasus of pure natural stands of spruce (*Picea orientalis*) and pine (*Pinus kochiana*).

162. The key tree species in forest ecosystems are hornbeam-oak (*Quercus iberica*), beech (*Fagus orientalis*), pine (*Pinus kochiana*), fir (*Picea orientalis*), and golden spreader (*Abies nordmanniana*). Some of these species were spotted near the alignment and should be noted by the Contractor. Species still known to occur in BKNP and listed in the Red Data Book of Georgia are: hornbeam (*Ostrya carpinifolia*), nettle tree (*Celtis caucasica*), wild pear (*Pyrus georgica*, *P. salicifolia*), bladder-nut (*Staphylea pinnata*, *S. colchica*), chestnut (*Castanea sativa*) and oriental oak (*Quercus macranthera*).

163. Near the project road on the north side, in the forested areas are situated mainly at the upper regions of the mountainous areas where the vegetation were mainly Oak (*Quercus iberica*), Hornbeam (*Carpinus caucasica*), Beech (*Fagus orientalis*). Near the road, trees were already cleared in the past and the vegetation in the strip were mainly replaced by shrubs such as *Paliurus spina christi*, *Spiraea hypericifolia*, *Carpinus orientalis*.

### 1.7.2 Fauna

164. Generally, the wildlife in the area has been described in nearby forested areas are not so diverse. The mammals are mainly represented by fox (*Vulpes vulpes*), jackal (*Canis aureus*), badger (*Meles meles*), weasel (*Mustela nivalis*), wild cat (*Felis silvestris*), Caucasian squirrel (*Sciurus anomalus*), European hare (*Lepus europaeus*) and some other small mammal populations; Vole (*Apodemus agrarius*), Caucasian Forest Mouse (*Sylvaemus fulvipectus*), a small Forest mouse (*Apodemus uralensis*), Scrub vole (*Terricola major*), Water vole (*Arvicola terrestris*), Mole (*Talpa caucasica*); Bats (*Vespertilionidae*) - Common pipistrelle (*Pipistrellus pipistrellus*), Brandt's Bat (*Myotis brandti*), Whiskered bat (*Myotis mystacinus*), Natterer's bat (*Myotis nattereri*).

165. Secondary information from other sources indicated the presence of birds which frequent the are forested areas in autumn such as rooks (*Corvus frugilegus*), Carrion crow (*Corvus corone*), Tit (*Parus sp.*), black-headed bunting (*Emberiza melanocephala*), Eurasian tree sparrow (*Passer montanus*), rock dove (*Columba livia*), common chaffinch (*Fringilla coelebs*), Eurasian skylark (*Alauda arvensis*), magpie (*Pica pica*), Common blackbird (*Turdus merula*), Eurasian wren (*Troglodites troglodites*).

166. In terms of reptiles the most notable are Sheltopusik (*Pseudopus apodus*), Javelin sand boa (*Eryx jaculus*), Grass snake (*Natrix natrix*), Coluber (*Coluber shmidtii*, *Coluber najadum*), Slow worm (*Anguis fragilis*), Caucasian rock agama (*Laudakia caucasica*), a lizard (*Lacerta media*), Greek tortoise (*Testudo graeca*). The amphibians present are Green toad (*Bufo viridis*), Marsh frog (*Rana ridibunda*), Legged frog (*Rana macrocnemis*), Common Tree frog (*Hyla arborea*). The ommon invertebrate species in the area are: nematodes (*Nematoda*), spiders (*Arachnida*), earthworms and freshwater worms (*Oligochaeta*), dragonflies (*Odonata*), cockroaches (*Blattodea*), moths and butterflies (*Lepidoptera*), orthopterous insects (*Orthoptera*), Beetles (*Coleoptera*), bees, wasps and ants (*Hymenoptera*), two-winged flies - mosquitoes, flies

(*Diptera*), shrimp's eye (*Mantodea*).

167. Documents referring to BKNP indicated that 55 mammal species, 95 bird species, 17 reptile species and 9 amphibian species have been identified. The prominent species include lynx (*Lynx lynx*), brown bear (*Ursus arctos*), wolf (*Canis lupus*), Caucasian deer (*Cervus elaphus maral*), chamois (*Rupicapra rupicapra*), roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*), golden eagle (*Aquila chrysaetos*) and the Caucasian black grouse (*Tetrao mlokosiewiczi*).

168. The waterfowl species of special interest are the grey crane (*Grus grus*), black stork (*Ciconia nigra*) and the velvet scoter (*Melanitta fusca*). In the rivers and creeks, trout (*Salmo fario*) are common. Numerous species reported for the area that are listed in Georgia's Red Data Book include: lynx, Caucasian deer, eagle, black grouse, several bat species (i.e. *Rhinolophus hipposideros*, *Myotis emarginatus*, *Barbastella barbastellus*), Eurasian otter (*Lutra lutra meridionalis*), Caucasian viper (*Vipera kaznakovi*) and Transcaucasian sand vipers (*V. ammodytes transcaucasiana*), Caucasian parsley frog (*Pelodytes caucasicus*) and the Caucasian salamander (*Mertensiella caucasica*).

169. Listed in Red Data List of International Union for Conservation of Nature (IUCN) are the chamois, three bat species, five rodent species, the Caucasian black grouse and the Caucasian viper. The BKNP provides the most important refuge to the fauna in the region. The park area still sustains and provides habitats to healthy populations of most ungulates and birds typical for the Central Lesser Caucasus. Reported to be seen within the park are Lynx, brown bear and wolf.

170. Several species of lizards and snakes can be found in the Park such as the Caucasian agama (*Laudakia caucasica*), Armenian rock lizard (*Lacerta armeniaca*) and Greek Tortoise (*Testudo graeca*). The park is a habitat to the following rare bird species: Golden eagle (*Aquila chrysaetos*), Griffon vulture (*Gyps fulvus*), Black vulture (*Aegypius monachus*) and Caucasian Black grouse (*Tetrao mlokosiewiczi*).

## **1.8 Sensitive Habitats & Protected Areas**

171. In Georgia for managing natural resources, the Ministry of Environment and Natural Resources Protection (MoENRP) declares protected areas on behalf of the Department of Protected Areas and Wildlife (DPAW), which then have to be endorsed by the Parliament. The two key protected area categories in Georgia with the strictest protection provided to the corresponding area are "Strict State Nature Reserves", and "National Parks". According to Georgian Law the Strict Nature Reserve category does not permit public access. On the other hand National park is generally created in order to protect relatively large, natural ecosystems of exceptional beauty that are of national and international importance and to conserve the existing biodiversity. In addition, national park plays an important role in the development of eco-tourism, particularly in the promotion of natural and cultural heritage of Georgia at the international level.

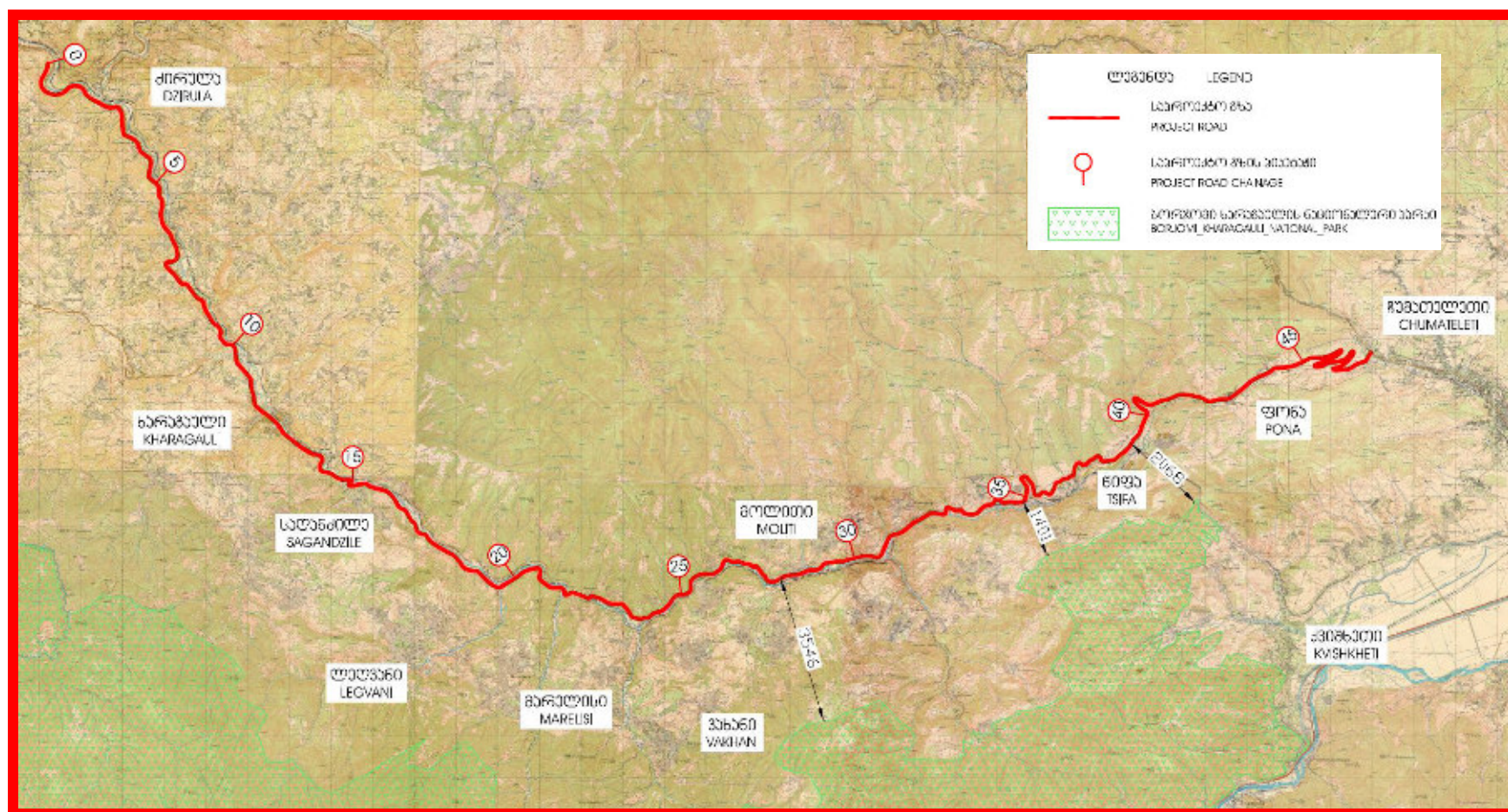
172. The Borjomi-Kharagauli National Park was legally established by the Decree #447 of the Cabinet of Ministers of the Republic of Georgia of July 28, 1995 "On Promoting Measures for the Creation of the System of Protected Areas and the Establishment of the Borjomi-Kharagauli National Park". The rationale for the creation of the Borjomi-Kharagauli National Park was to supplement areas to the existing Borjomi Strict Nature Reserve which on its own is not considered large enough to meet the minimum critical size requirements needed to safeguard the ecological integrity for the protection of the ecosystems. In addition the expansion of the

Strict Nature Reserve and its incorporation into the national park category was to capitalize on the recreational and educational opportunities offered by a national park.

173. The BKNP is in the list of Category II – World Conservation Union - IUCN protected areas categories, and thus recognized by international bodies such as the United Nations and by many national governments as the global standard for defining and recording protected areas and as such are increasingly being incorporated into government legislation. Category II applies to Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities. The IUCN puts forward the primary objective as the protection of natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation. The key role of Category II is to provide large-scale conservation opportunities where natural ecological processes can continue in perpetuity, allowing space for continuing evolution.

174. The project road runs along the northern foothills of the Borjomi-Kharagauli National Park (BKNP), and along the Chkherimela River. On the northern edge, the BKNP boundary follows the tributary of the Chkherimela River to the park entrance at Nunisi. From there, the boundary proceeds to the north-west by-passing the village of Vakhani from where it runs parallel to the actual land use/pastoral line which separates the park forests from the villages of Vakhani to Marelisi. At Marelisi, another entrance gate is situated, and from here the boundary proceeds in westerly direction passing Vani village to the South crossing large tracts of pure stands of forests which all are free of settlements and land use. From here it continues in south-westerly direction for approximately 25 km where it reaches the alpine grasslands of the Meghruki Mountain Range. A map of the project road and indicative boundary of the BKNP is shown below.





175. The shortest distance between BKNP and the existing project road is approximately 1.3 km. BKNP is separated from the existing project by a river gorge, which prevent the transposition of flora and fauna. Therefore the project will have no direct impacts on the biodiversity of the BKNP.

Figure 10: Shortest distance between Project Road and the BKNP





176. The BKNP is located in the central part of the Caucasus Isthmus and comprising the eastern section of the Lesser Caucasus Mountain chain. The BKNP has an approximate area of 80,000 hectares of forest ecosystems and sub-alpine and alpine meadows typical for the central region of the Lesser Caucasus within Georgia. The Park areas have served as a refuge to the large spectrum of flora and fauna of the Lesser Caucasus and have provided protection to several rare and endangered species, relic species and species endemic to the central Caucasus Region. The Park was established in 1995 and opened in 2001 with the aim to preserve the wild nature area especially the virgin mountain forest.

177. The BKNP covers six (6) districts - Borjomi, Kharagauli, Akhaltsikhe, Adigeni, Xashuri and Baghdadi. Administrative and visitors centers for the national park are situated in Borjomi and Kharagauli. The park administration manages 4 various types of protected areas – (i) Borjomi Strict Nature Reserve; (ii) Borjomi-Kharagauli National Park; (iii) Nedzvi Managed Reserve; and (iv) Goderdzi fossil forest Natural Monument.

## **1.9 Sensitive Receptors**

178. Sensitive receptors are those areas where the occupants are more susceptible to the adverse effects of exposure contaminants, pollutants and other adverse substances that the activities may generate. These generally include, but are not limited to, hospitals, schools, daycare facilities, elderly housing and convalescent facilities. Such facilities along the project road are:

- a) Dzirula School (km 2+743) – This school is located on the left side of the project road along the south bank of the river. The school yard's southern fence is right next to the project road. The school has a student population of around 56 pupils and provides education up to the secondary level. It has 18 teachers and 5 non-teaching personnel. The facilities in the school consisted of 12 classrooms, a library and a faculty or teacher's room. Power is supplied by JSC Energo-Pro Georgia and water from the village. The students are currently served by 2 school buses to bring them to school.
- b) Sighandzile School (km 14+968) - This school is located on the right side of the project road along the south bank of the river. The school also provides up to secondary schooling level to a student population of 67 pupils. It has a total of 32 teachers and 5 non-teaching personnel. The school has 12 classrooms, a library and a teacher's room. Recently, the school has a new toilet building for the use of the students. Power is supplied by JSC Energo-Pro Georgia and water from the village. The students are currently served by 2 school buses to bring them to school.
- c) Moliti Ambulatory (km 28+473) – This medical facility is located at the western edge of Moliti village and at the left hand side of the road. It is not directly along the edge of the road. A small access way leads from the road into the yard of the ambulatory. There are two doctors that regularly provide medical services – one family doctor and the other a pediatrician and assisted by 2 nurses. Currently, this medical facility can be described as in poor conditions, with no water supply and the building and fence needing repairs.
- d) Moliti school (km 29+032) - This school is located 50 meters on the left side of the project road with 2-3 houses in between. Its school yard is fenced all around with a gate. The school also provides up to secondary schooling level to a student population of 71 pupils. It has a total of 30 teachers and 5 non-teaching personnel. The school has two buildings with 20 classrooms, a library and a



teacher's room. Power is supplied by JSC Energo-Pro Georgia and water from the village. The students are currently served by 2 school buses to bring them to school.

179. Aside from the possible impact due to noise, dust, vehicular emissions during construction and operations of the project, public safety can be a concern when trucks, equipment and construction materials are brought to the sites near these sensitive receptors. Disturbances may occur during class hours and treatment period and traffic safety may be a concern with hazards to children as they walk or commute to and from schools.

## **2. Socioeconomic Information**

### **2.1. Social and Economic Resources**

#### **2.1.1. Country Overview**

180. Georgia's main economy consists primarily of: (i) agriculture with the main products such as grapes, citrus fruits, and hazelnuts; (ii) mining of manganese, copper, and gold; and (iii) producing alcoholic and non-alcoholic beverages, metals, machinery, and chemicals in small-scale industries. On the other hand, Georgia imports natural gas and oil products. However, its energy needs have been met in a better way with the improvement of hydroelectric plants and procurement of gas supply from Azerbaijan, rather than from Russia with its participation in the Baku-Tbilisi-Ceyhan oil pipeline, the South Caucasus gas pipeline, and the Kars-Akhalkalaki Railroad.

181. In 2006-07, Georgia's GDP was at 10%, but sank due to its conflict with Russia in 2008. In 2010-13, the economy seems to have improved but foreign direct investment inflows were still sluggish. Unemployment remained high with about 15 percent in 2012. More than 55 percent of the work force is employed in agriculture (mostly self-employed) characterized by family-based subsistence farming, contributing only 8.2 percent of GDP.

182. Recent information from ADB indicated that Georgia's gross domestic product (GDP) grew by and estimated 6% in the first half of 2014, after a relatively flat performance in 2013. This was due to higher domestic demand, exports, foreign direct investment, and remittances, as a low refinancing rate and increased fiscal stimulus improved business confidence. However, factors such as growth slowdown in the Russian Federation and continuing geopolitical uncertainty may affect the forecast in 2015.

183. Recent statistics from the World Bank also showed aggregate demand increased due to higher government expenditure and higher exports to Russia. Also the poverty figure of 14.8 percent in 2012 declined from 17.7 percent in 2011 while extreme poverty fell from 5.5 percent to 3.7 percent over the same period. However, rural poverty is still high although on regional basis there are improvements in poverty levels. In 2014, the average monthly income in Georgia is around 864.39 GEL as indicated by the National Statistics Office of Georgia.

184. Tourism is among the fastest growing economic sectors in Georgia, which has high potential for further development. In recent years, the number of visitors to Georgia has been increasing significantly contributing to the growth of other tourism related sectors. In 2011, Georgia registered 3 million visitor arrivals, 40 percent increased as compared to 2010. To foster the development of the tourism sector, the Government of Georgia invested heavily in the development of the sectors that can propel tourism such as transportation, basic infrastructure,

and renovation and development of tourism destinations. Government figures show that in the second quarter of 2014, the share of tourism in the GDP was estimated at 7.2%, which is the highest since 2007.

185. According to the 2010 figures from the National Statistics Office of Georgia, the population of Georgia was 4.436 million. This consists mainly of 84% Ethnic Georgians with the other groups include Abkhazians, Ossetians, Armenians, Azerbaijanis, Greeks, Jews, and Russians. Georgian is the primary language of approximately 71% of the population, followed by 9% Russian, 7% Armenian, 6% Azerbaijani, and 7% other languages.

### **2.1.2. Regional Information**

186. The two (2) regions that are traversed are Imereti region and Shida Kartli. Most of the project road is within Imereti Region and largely within Kharagauli districts. The initial portions in the west are part of Zestafoni District, while the end at Chumateliti is within Khashuri District (part of Shida Kartli Region).

187. Imereti region has a number of centers which include Samtredia, Chiatura (manganese production centre), Tkibuli (coal mining centre), Zestafoni (known for metals production), Vani, Khoni, and Sachkhere. By tradition, Imereti is an agricultural region and is known for its mulberries and grapes. In 2012, the population of Imereti Region was 707.5 thousand with around 98.5% Georgians and the rest Abkhazians, Azeris, Russians, etc.

188. Shida Kartli is situated in a middle section of lowland between the Greater and Lesser Caucasian mountain range in East Georgia. The economic activity of Shida Kartli primarily consists of the following industries: agriculture (agricultural industry), production, tourism, trade (commerce), transport and communications, energy, construction (including roads and other infrastructure). Shida Kartli is primarily a rural region where the level of urbanization is below 40% which indicates a developing region. The population of Shida Kartli is 314.6 thousand people, with nearly half residing in Gori municipality and the remaining population is almost equally distributed among three municipalities: 20% in Khashuri and 17% each in Kartli and Kaspi.

189. The economy in the vicinity of the project road is largely agricultural in nature with lands devoted to farming, orchard and animal herding. The biggest settlement is found in Kharagauli, and serves the main urban service center. Commercial establishments lined the road on both sides as it goes through the town. However, within Imereti Region, the main city is Kutaisi, the second largest city in Georgia.

### **2.1.3. Local Information**

190. Most of the rural population along the project road depends on subsistence agriculture and livestock. The mountainous areas, especially those after km 25 are marginally suited for conventional agriculture due to unfavorable terrain, poor quality soils and harsh climatic conditions. The forested areas provide some potential resource use combined with specialized and “cottage-industry” type production of endemic agro-species for the international seed bank market.

191. Small and mid-sized villages or settlements can be found in close proximity to the road; among them are Dzirula, Leladziseuli, Lashis Igoreti, Lashe, Islari, Saghandzile, Didvake, Vaxani, Marelisi, Zedubani, Babi, Nebodziri, Bezhatubani, Golatubani, Tsipa, Phona, and Moliti.

These villages/settlements are mostly nestled in narrow river gorges with poorly developed social infrastructure and little opportunity for infrastructure improvement. Opportunities are much better for communities located along highways and the railway line. The end point is Chumateleti, which has access to the E-60 Highway and serves as the junction point of the project road.

192. The project road traverses through fourteen (14) municipalities (Sakrebulo) – two (2) are part of Zestafoni District at the west end; ten (10) are within Kharagauli District in the middle; and two (2) are part of Khashuri District at the east end. Both ends have access to E60 and it can be said that their socio-economy is mainly driven by this major. It is the municipalities of the Kharagauli District that would depend much on the construction of the road and also for this reason that the local information is important for them. Some gathered socio-economic information gathered from Kharagauli District is shown below.

193. Population information is shown in the succeeding Table below for most of the municipalities. Large portion of the population within Kharagauli District resides in Daba Kharagauli, Kitskhi and Legvani. Below is the population Table.

**Table 15: Population for Kharagauli Municipalities**

No.	Municipalities	Population	Male	Female
1	Lahse	1096	500	596
2	Kitskhi	2564	1200	1364
3	Bazaleti	653	280	373
4	Daba Kharagauli	2938	1350	1588
5	Sagandzile	1374	600	774
6	Legvani	1704	800	904
7	Vakhani	1015	450	565
8	Moliti	1502	680	822
9	Zvare	1120	500	620
10	Tsifa	1002	450	252
11	Zvare			
12	Tsifa			

Source: Kharagauli District (Nov. 2014).

194. From the Kharagauli District office the employment information is shown below. As a rural and countryside setting, agriculture is expected to be the main industry with the main crops as corn, grapes and vegetables. The greatest percentage of agricultural are reported to be in Tsifa, Zvare and Lashe. While the greatest percentage of employed is in Daba Kharagauli with big percentage in non-agriculture and other industries.

**Table 16: Employment Information for Kharagauli Municipalities**

No.	Municipalities	% of Employed Population	% of Pop'n in Non-Agriculture Industry	% in Other Industries	% of Pop'n in Agriculture Industry
1	Lahse	8.2	4	4.2	83.6
2	Kitskhi	15	5	10	70
3	Bazaleti	7.5	2.5	5	85
4	Daba Kharagauli	22.5	2.5	20	55
5	Sagandzile	9.5	6	3.5	81
6	Legvani	8.6	6	2.6	82.8
7	Vakhani	7.5	5	2.5	85
8	Moliti	8.6	5.4	3.2	82.8
9	Zvare	7.8	4	3.8	84.4
10	Tsifa	6.5	4	2.5	87

Source: Kharagauli District (Nov. 2014).

195. In terms of land area, the largest municipality area is that of Legvani, followed by Kitski and Moliti. However, the greatest area for agriculture is located in Moliti, while the greatest for non-agriculture is in Kitskhi as shown in the Table below. This may indicate future potential area for investment once the road project is realized

**Table 17: Land Area Information for Kharagauli Municipalities**

No.	Municipalities	Total Land Area (hectares)	Agriculture Industry		Non-Agriculture Industry	
			% of Area	Hectares	% of Area	Hectares
1	Lahse	885	10.5	92.925	35	309.75
2	Kitskhi	1413	38	536.94	49	692.37
3	Bazaleti	781	29.3	228.833	25.8	201.498
4	Daba Kharagauli	200	9.3	18.6	30.3	60.6
5	Sagandzile	1092	15.8	172.536	42.2	460.824
6	Legvani	1609.5	11.3	181.8735	28.7	461.9265
7	Vakhani	821	45	369.45	30.8	252.868
8	Moliti	1230	45	553.5	24.9	306.27
9	Zvare	1026	40.3	413.478	18.8	192.888
10	Tsifa	1126	22.5	253.35	24.3	273.618

Source: Kharagauli District (Nov. 2014).

196. As presented in the Table below, all of the municipalities have electricity and practically all has pipe water supply. However, only Daba Kharagauli has gas supply connection with around 14% of the population. This would indicate that large number of the population may be using wood heat their homes in winter and on a daily basis to cook their food. This can put strain to the tree forest resources in the area.

**Table 18: Basic Infrastructure Information for Kharagauli Municipalities**

No.	Municipalities	Percentage of Population in the Municipalities		
		Pipe Water Supply	Electricity	Gas Supply
1	Lahse	80	100	0
2	Kitskhi	90	100	0
3	Bazaleti	90	100	0
4	Daba Kharagauli	90	100	13.75
5	Sagandzile	90	100	0
6	Legvani	90	100	0
7	Vakhani	90	100	0
8	Moliti	90	100	0
9	Zvare	90	100	0
10	Tsifa	90	100	0

Source: Kharagauli District (Nov. 2014)

197. The main educational service infrastructures that are existing in the area with the presence of vocational/technical services in practically all of the municipalities (Table below). University education is available in the main cities like in Kutaisi and Gori.

**Table 19: Educational Services for Kharagauli Municipalities**

No.	Municipalities	Pre-school/ Kindergarten (3 years)	Main School (Class 1-12)	Vocational/ Technical (1-2 years)
1	Lahse	0	1	1
2	Kitskhi	1	2	1
3	Bazaleti	0	1	1
4	Daba Kharagauli	2	3	1
5	Sagandzile	0	1	1
6	Legvani	1	1	1
7	Vakhani	1	1	0
8	Moliti	1	1	1
9	Zvare	1	1	1
10	Tsifa	0	1	1

Source: Kharagauli District (Nov. 2014).

## **2.2. Cultural Resources**

198. Two (2) cultural monuments were found along the south side of the road: the first at km 9+860 at the entrance of Kharagauli and the second one at km 13+086 after Kharagauli town. These erected monuments will be outside the construction strip of the project roads

199. The first monument is a locally called as the monument of “Giants” also called “Devebi” monument. It was said that in 1928 Prof. George Nioradze discovered the dwellings of upper Paleolithic people and which is now conventionally named the “Giant’s hole”. In 1982, an architect George Kiknadze created the statues of the giants which are now situated near the entrance to Kharagauli. Due to unverified finds of remains of giants in the area, it became a folk lore that giants inhabited the area in the ancient times.



Source: The Consultant.

**Figure 11: Giant’s Monument at km 9+860**

200. The second monument at Km 13+086 is a cultural monument dedicated to artist in the locality. This monument is located at the outskirts of the main town of Kharagauli. This monument serves as symbol of the local people’s dedication to art and culture and remembrance of fondness of arts and culture in general.



**Figure 12: Cultural Monument at km 13+086**

201. Near the project road, up the Chkherimela River gorge an old fortress ruin is found – the Kharagauli fortress, typical to the construction of the Middle Ages. It was in this fortress that king Vakhtang VI got married. Vakhtang VI, also known as Vakhtang the Scholar and Vakhtang, and the Lawgiver, was a Georgian monarch of the royal Bagrationi dynasty. He was one of the most important and extraordinary statesman of the early 18th Georgia, he is known as a notable legislator, scholar, critic, translator and poet.

### **2.3. Tourism**

202. The BKNP is considered one of the most visited tourism sites in Georgia. The Park is covered with native forest and sub-alpine and alpine meadows, and is home to rare species of flora and fauna. A marked and well-arranged 400 to 2,642 meter route network for tourist has been established, allowing visitors to trek within the Park for one to several days and is open throughout the year. The BKNP administration offers interesting activities such as hiking, horse riding, biking, snow-viewing, cultural and educational tours.

203. Between Khashuri and Kharagauli on the northern edge of the National Park and deeply hidden in the subtropical forests, lies the health resort of Nunisi. This resort is famous for its mineral water springs, however the church of the virgin built in the end of the 6th century is too charming not to visit. There is a Spa Hotel in Nunisi and a campsite at the same resort. Due to the beauty of these surroundings, a lot of people visit this place in summer.

## F. Anticipated Environmental Impacts and Mitigation Measures

204. The anticipated environmental impacts of the proposed road project are likely to be resulting directly from construction activities. Environmental impacts during construction are dependent on: (i) modification of the road vicinities to conform to desired designs; (ii) contractors' work practices, especially those related to the extraction and storage of construction materials and cleanliness of the work sites and plants; (iii) coordination with local communities in terms of traffic management and use of land and utilities; and (iv) enforcement of construction practices and standards through strict supervision.

### 1. Types of Impacts and Mitigation Aspects

205. In General, the changes that a project introduces into the environment cause impacts as follows:

- (i) **Direct Impacts** – these impacts are caused directly by the Project to the physical and social environment near or of close proximity to the project site/s.
- (ii) **Indirect Impacts** – are those resulting to a certain degree attributable to the Project although not having direct link with the project.
- (iii) **Cumulative Impacts** - impacts that are in conjunction with other on-going activities, however having additive effect and thus creating significant consequences to the physical and social environment.

206. In terms of temporal framework, the impacts can be categorized as:

- 1. **Short-term** – impacts that have temporary effects on the environment.
- 2. **Long-term** – impacts that will be existing for longer periods of time, and may be also considered to be permanent.

207. Both short-term and long-term impacts may be either beneficial or adverse. And in terms of level of impacts they can be **slight, moderate or severe**. Slight impacts are of small consequences and more likely reversible; while severe impacts result into considerable damage and disruptions and can be irreversible in which case replacement or compensation becomes the only remaining measure.

### 2. Impacts in the Project Phases

208. Road and bridge construction entails a number of activities which are expected to introduce impacts and disturbances to the general environment, especially during the construction period. Most of these impacts are confined within the right-of-way, construction sites, and facility sites; while some activities can affect the outlying areas or even a wider area, especially if not properly mitigated.

209. As defined above, direct impacts are those that are clearly introduced by the project during the construction period such as modification of the physical land features at the specific construction site. Indirect impacts are those that are consequences of the changes in the environment or secondary effects due to the introduced changed, which can occur or accumulate beyond the construction phase. Both of these direct and indirect impacts can be classified as minimal to adverse depending on the level of intensity that they affect the natural environment components, such as air and noise, flora and fauna, water, topography, and landuse.

210. In the opinion of the TA Consultant<sup>6</sup>, the Design-Bid-Build (traditional approach) for the procurement of Works is more favorable to the project over the Design-Build to ensure that Safeguard measures will be properly implemented. It is for this reason that the Detailed Design can be considered part of the Pre-Construction Phase. The impact assessment and mitigating measures cover the entire project cycles as described in the following sections.

## **2.1 Pre-Construction & Design Phase**

211. The Pre-construction and Detailed Design Phase covers the period when the Design Consultant accepts the design work up to finalization of the Tender Documents with or without assistance scope for actual bidding process. The engineering designs shall include all the necessary work relevant to detailed site surveys, design computations, technical drawings, environmental and social requirements, technical specifications and tender documents. This will be followed by Tendering process from which the Client/Employer shall decide on the Contractor for the civil works.

212. During the pre-construction and detailed engineering phase, the design engineers should be guided on a number of items need to be considered in the production of road and bridge designs, and which will have relevance to the environmental aspects of the project. These items are as follows:

- To minimize impacts of erosion, side slopes of embankments will be designed to reflect soil strength and other considerations as included in the project specifications in order to reduce slips or erosion; for embankments greater than 6m, stepped embankments will be used.
- For geology and seismic conditions, cuts on the mountain and hillsides should be stable or be reinforced; earthquake loading shall be applied to the design of structures, to ensure that seismic events do not have negative impacts during the operational phase of the Project.
- On Flora and fauna – The Design Engineers should provide guideline in the design for the Contractor to ensure that his ancillary facilities such as asphalt plants, construction camps and others are properly sited to protect indigenous flora and fauna. The Contractor should be instructed to avoid loss of trees, where possible, and should employ techniques such as asymmetrical widening. Where trees must be felled, the Contractor should be instructed that each tree removed should be replaced by at least two new saplings of the same or similar species and be planted at suitable locations, or as designated by the tree owner. Disturbance to wildlife habitats should be avoided especially near the BKNP.
- On cultural, historical and archaeological sites – no significant encroachment to any cultural, historical or archeological site and monuments that eventually may discovered during Detailed Design survey works. Such guideline should be also implemented during the actual construction.
- Health and Safety – The Contractor shall be provided guidelines in the design or in the Technical Specifications to ensure that traffic safety issues shall be responded to during the construction phase of the Project, including incorporation

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<sup>6</sup> Kocks Consult, GmbH is the Consultant for the Project TA-8411 GEO: Secondary Road Improvement Project – Feasibility Study and Preliminary Design (Dzirula-Kharagauli-Moliti-Pona-Chumateleti Km 0.0 – Km 50.0 Road Section)



of: (i) Safety barriers; (ii) Traffic signs; (iii) Road crossings; (iv) Speed bumps; and (v) Speed limits.

## 2.2 Construction Phase

213. The Construction Phase includes the mobilization of the Contractor to the site, actual construction works up to the completion/Handing-Over to the Client/Employer, at which time the Certificate of Completion shall be issued. During the mobilization period, it is important that the Contractor should bear in mind that it is his contractual responsibility to protect the site's physical and social environment against any adverse impact of his construction activities. To ensure this, part of his responsibility is to develop his own **Site Specific Environmental Management Plan (SSEMP)** and to establish site **Baseline Environmental Parameters**, which later can be used in ADB's **Project Performance Management System (PPMS)**.

214. A suggested outline of a suitable SSEMP is shown below:

- Management of Physical Environment
  - Soils
  - Water
  - Air
- Management of Ecological Environmental
  - Flora
  - Fauna
  - Protected Areas
- Management of Economic Characteristics
  - Infrastructure
  - Transport
  - Land Use
  - Agriculture
- Management of Social and Cultural Resources
  - Communities, Health and Education Facilities
  - Historical and Cultural Areas
  - Noise

215. The construction stage impacts and mitigation measures are described in the Environmental Management Plan of this IEE report.

216. Consistent with ADB's SPS 2009, the implementation of measures prioritizes on **avoidance**; followed by **reduction**; then **mitigation**; and finally, if all else fails, **replacement of** what was impacted or **compensation** to the impacted parties. Accordingly, the selected Contractor for the project should develop their own **Site Specific Environmental Management Plan (SSEMP)** specifically to conform to the IEE and its EMP, and should reflect the actual environmental conditions during the "Possession of Site" in construction stage of the project. The Tender/Bidding and Contract documents are recommended to specify that the SSEMP shall be required and be submitted within **28 days (or any agreed specified date)** of the award of the Contract and subject to approval of the Engineer (CS Consultant) prior to the start of the construction works. The SSEMP shall then be updated from time-to-time to incorporate any changes in the field conditions while construction will be in progress. The SSEMP should also contain the following Annexure:

- Air Pollution Control Plan
- Dust Suppression Plan
- Water Management Plan
- Noise Management Plan
- Flora and Fauna Protection Plan
- Camp And Workshop Management Plan
- Facility Layout Plans and Plants Operation Plan
- Material Source Management and Reinstatement Plan
- Waste Management Plan
- Site Drainage Plan
- Soil Management Plan
- Spill Prevention Plan
- Community Protection Plan
- Traffic Management Plan
- Worker's Health and Safety Plan
- Grievance Committee Plan
- Cultural, Historical, Archaeological Find and Protection Plan

217. It is important that Air and water quality issues arising from the siting and operation of material sources (borrow pits and quarries) and processing plants (asphalt plant and cement batching plant) should be avoided by the Contractor by ensuring that these sites are sufficiently far from residential areas. Permits for these sites should be provided only if they are at reasonably far distance from any residences. Material sources should not be within any protected area (the BKNP) and measures should be in-place to ensure that any materials are transported properly with avoidance of droppings along the transport routes which can in turn inconvenience local residents or damage infrastructure.

218. Prior to any start of the works, the Contractor shall establish baseline parameters as reference for his periodic monitoring. This will be done to improve the monitoring work consistent with the Environmental Management Plan (EMP). Prior to any construction works, the Contractor should undertake initial sampling and assessment of important indicators along the project road. Results of these sampling and successive monitoring results will be submitted to the Roads Department to form part of the Data Base to be used for overall monitoring of the project and to ADB for the PPMS.

219. These sampling locations should be selected in coordination with the Engineer and/or the Environmental Specialist of the Construction Supervision (CS) Consultant for the project. Such parameter testing needs to be done as soon as possible, preferably right after construction contract has been awarded to the Contractor. The corresponding baseline parameter readings should be established in the undisturbed state. This can be planned and programmed effectively by the Contractor in coordination with the CS Consultants for the project in consideration of the baseline parameters obtained in this IEE. The parameters to be obtained are as shown below:

**Table 20: Environmental Impact Parameters and Indicators**

Environmental Aspect	Environmental Parameters	Location	Recommended Timing
Air Quality	8-hour daytime sampling for NO <sub>2</sub> CO	At the following locations. Dzirula School (km 2+743) Sigbandzile School (km 14+968) Moliti Ambulatory (km 28+473)	✓ Start of Project or After Rest Period (for

Environmental Aspect	Environmental Parameters	Location	Recommended Timing
	O <sub>3</sub> TSP (Dust)	Moliti school (km 29+032) In addition the Engineer may select additional locations up to a total of 10.	baseline) ✓ Monthly and Quarterly
Water Quality	BOD COD Turbidity Oil and Grease, Petroleum components	At 5 Sampling stations. Station 1 is located at the lower region of the Dzirula River; Stations 2 and 4 were tributaries of Chkherimela River; Station 3 is the mid-reach of the Dzirula-Kharagauli rivers; and Station 5 is the headwaters of Chkherimela River. In addition 50 m up and downstream where bridge construction over rivers will be done and 50 meters downstream of quarry locations.	✓ End of Project
Noise Level	Daytime Noise Levels (Decibels) 6am-8pm	At the following locations. Dzirula School (km 2+743) Sigandzile School (km 14+968) Moliti Ambulatory (km 28+473) Moliti school (km 29+032)  In addition the Engineer may select additional locations up to a total of 10.	
Flora and Fauna	Loss of biodiversity	Forested Areas traversed by the road	
Cultural, Historical Monuments and Archaeological Finds	Damage and Loss	Defined Sites and Discovered Sites	

Source: The Consultant.

220. Construction operations will involve the following processes and key activities:

- Relocation of utilities;
- Drainage works (excavations for pipe culverts; laying of pipe culverts and concrete);
- Earthworks (site clearance and grubbing; excavations; fill and compaction; material transport);
- Construction of structures (excavation and construction of bridges and culverts; cast in concrete);
- Embankment construction;
- Pavement construction;
- Road utilities;
- Site clearance.

221. Construction materials required for the implementation of the Project will include:

- sand/silt/gravel for embankment construction;
- gravel, rock and stone for base / sub-base;
- bitumen for wearing course;
- concrete for bridges / culverts; and
- topsoil for covering of embankments / landscaping.

222. Suitable borrow areas are indicated in the chapter “4.1 Material Sources and Cut and Fill.”

223. The type and characteristics of construction equipment is listed in the following table.

**Table 21: Construction equipment type and characteristics**

Equipment type and characteristics	Minimum capacity
Asphalt plant	
Aggregate Crusher	
Dozer with ripper	150 kW
Motor grader	150 kW
Excavator	130 kW
Tamping / grid roller	75 kW
Steel drum vibrating roller	75 kW
Water browser	14000 l
Rock drill (hand held)	
Back hoe excavator	0.5m <sup>3</sup>
Track loader	1.5m <sup>3</sup>
Wheel loader	1.5m <sup>3</sup>
Static roller	15t
Pneumatic roller (PTR)	15t
Tipping truck	15m <sup>3</sup>
Dump truck	12 m <sup>3</sup>
Mobile concrete batching plant	5m <sup>3</sup>
Concrete truck mixer	7m <sup>3</sup>
Concrete mixer	0.5m <sup>3</sup>
Concrete vibrator	
Concrete pipe casting machine	
Mobile crane	≥20t
Truck mounted crane	5-10t
Pedestrian/ Plate / Tamping roller	
Other essential supplementary sets, e.g. main workshop, lowbed trailer units, generators, mobile workshop, service trucks, welding machines, tyre repair shops etc.	

224. During the actual construction phase, practically most of the significant impacts are likely to occur on the account of the actual disturbance to the existing environment. The construction would entail a series of activities at the specific work sites and in other selected areas for material sources, processing plants, campsites and vicinities. At the initial phase, where the old bridge structures will be demolished to make way for new ones, detour roads will be established.

225. The typical construction process will entail, first the closure or restriction of existing traffic at the work sites and establishment of detour road. The provision of the new detour road will entail, stripping and clearing of vegetation, excavation, filling and leveling of the area, provision of embankment fill and necessary surfacing for the existing traffic.

226. Road widening will entail earthwork and breaking of rocks, which need to be hauled to some designated stockpiles. These works by themselves disturb the natural surroundings, and affect vegetation. It is important that measures for proper maintenance of the detour road be established to respond to traffic and community safety, control of dust, noise and emissions. Replanting of affected trees should be done as soon as possible and schemes for detour roads and soil stockpiles should favor tree preservations. Waterways should be respected and contamination should be prevented.

227. The succeeding stages would entail demolition of existing pavement and bridges. This will involve scarifying old pavement structure, and earthworks to conform to design requirements. For the bridges, it will be breaking the structures at the existing connections and removal of deck and girder elements by use of heavy equipment. These old bridge components will be placed in designated areas, which will not impact the natural environment, impede traffic

and cause safety concerns to the general public. The bridge abutments and underlying foundations will be excavated and removed to give way for replacement structures.

228. The succeeding steps will involve construction of the new pavement and bridges. The pavement construction will entail embankment filling, subbase, base course and asphalt pavement layer construction. In the end the final wearing course will be laid along all throughout from the existing road, onto the approach roads, and onto the deck slab in such a manner to have smooth layer of road and bridge pavement. Embankment works will entail transport of approved fill materials from borrow pits or from cuts if found to be suitable. The suitable materials for subbase and base course will come from quarries or borrow pits of approved properties. These pavement substructures will be engineered and compacted to desired degrees with the use of graders, and compactors in accordance with designs and specifications. The asphalt pavement layers will be provided by asphalt plants with crushed stones and rocks for the aggregate requirements. It will be the responsibility of the Contractor that asphalt plant would produce the necessary required bituminous mix in conformance to environmental requirements for asphalt plant siting and operations.

229. The bridge construction will start with the substructure such as the foundation systems and piers. This will be followed by the superstructure elements of girders, deck slab and railing. The construction of the superstructure components such as the girder and deck slab will involve installation of formworks, casting of concrete and in some instances, post tensioning of tendons when necessary. The important guideline to be brought forward is the use of precast elements to minimize pouring and casting of superstructure elements over water to minimize contamination. Concrete batch plants will provide the necessary concrete for these structural elements from approved sites with operational guidelines in accordance with environmental protocols and industry standards.

## **2.3 Operations and Maintenance Phase**

230. After the Handing-Over to the Client, a one-year defects liability period ensues, in which the Contractor will still be responsible in remedying any deficiency or flaws in the overall works. After which the Operation and Maintenance Phase follow, in which the Client takes over with full responsibility for the operations and maintenance of the road.

231. The projected service life of the road is 20 years and over this operations period, the impacts to the environment are rather viewed as cumulative on account of the functions of the road components and can be in conjunction with other activities. Time-wise these impacts can also be long-term as they may manifest after construction and continue to persist for the entire usage and operation of the road. The perceived impacts will be on traffic safety to the communities, biodiversity, water quality, air quality and noise-level during the operation of the road.

## **2.4 Climate Change Impacts on the Project Road**

232. The project road is located in elevated and mountainous interior regions of Georgia, where the climate change impacts/factors will likely be on the following:

- Climate change can elevate the damage to the road and associated infrastructure due to severe storms in terms of more rains and snowfall. The increase in rainfall will increase the erosion of cut areas and devegetated sites, destabilized fill embankments and weaken underlying structures. Severe snowfall

can cause avalanche and also cause damage to structures and destabilized devegetated areas. Also during construction, severe storms and snowfall can disrupt construction activities, damaged installed/completed structural works and cause delays which later would increase construction cost of the project road.

- Adverse climatic conditions can gradually impact structural integrity and lessen life expectancy of the project. Because of this the designers should consider designing the road for more adverse weather conditions.
- During the operation of the project, climate change can lead to more frequent maintenance, repair and rebuilding; thus increasing the cost of the operations.
- On the positive side, warmer winters due to climate change can alleviate the clearing snow; which would mean less maintenance cost during the winter months

### 3. Assessment of Impacts and Mitigations

233. The assessment of impacts entails prediction of the expected positive and negative, direct and indirect effects to physical, biological, socioeconomic, as well as to cultural resources within the project's area of influence. Corresponding to this is the identification of the measures to avoid, reduce, mitigate, and replace or compensate these impacts. Included in the assessment is the determination of opportunities wherein the project activities can contribute to the enhancement of the projects sites where impacts will be recognized.

#### 3.1 Topographical Aspect

234. In the construction of the road and bridges, earthworks will be primary concern. Although, as stated, to minimize impacts along the project's right of way, considerable earthworks will be undertaken to improve the roads alignment and establish safe passage along the entire route. Cuts and excavations will be done and excess soil will have to be deposited in approved areas; and thus result in defacement of the natural topography. These concerns are addressed in this section.

**Table 22: Project Potential Impacts on Topography**

Project Potential Impacts on Topography	Recommended Mitigation Measures and Monitoring Activities
<b>Design and Pre-Construction:</b>	
Excavations and side slope cuts - In order to provide for sufficient road way widths, certain areas would have been excavated and side slopes need to be cut. Such undertaking will result in defacement of the natural topography of the area	To minimize cuts and excavation, designs should be appropriate to conform to safety and economy
Selection of Quarry Sites – Quarries should be selected properly to minimize undesirable impact to the general topography.	Several potential quarry sites have been identified in the Feasibility study. They are located in the region and near or in reasonable distance to the Project road, with some being operated with permits. The identified borrow areas are shown in the below Table 23.  It will be up to the Contractor which quarry sites to obtain materials from. Contractor should ensure that materials be obtained from operators with acceptable environmental management systems. New quarries to be operated by the Contractor must obtain the required permits prior to commencement of works at these sites. This shall include approval from the relevant agencies and to be verified by the

Project Potential Impacts on Topography	Recommended Mitigation Measures and Monitoring Activities
	<p>Engineer. Efforts should be made to ensure that quarries are as near to the site as practical to avoid unnecessary journeys. However, no quarry shall be located within one kilometer of any urban area, protected area or sensitive receptor. The locations of the quarries shall be indicated within the Contractor's SSEMP. In addition, Contractors should ensure that quarries and crusher plants are:</p> <ul style="list-style-type: none"> <li>• Located at least 300 meters from residential areas to prevent noise and dust impacts;</li> <li>• Located outside of agricultural land; and</li> <li>• Where possible located on government owned lands.</li> <li>• The contractor will wet unpaved routes which go next to settlements to suppress dust pollution when hauling material from borrow pits and provide covers for the load of all hauling vehicles to prevent dust pollution. Also wetting the aggregate load reduces potential dust emissions.</li> </ul> <p>In addition, alluvial material which will be excavated upstream from blocked culvert areas may be used as base material. This material shall be tested by the Contractor and Engineer for its suitability as base material before it may be used. A Quarry Site Reinstatement plan should be presented by the Contractor to the Engineer. The Quarry Site Reinstatement Plan must be approved by the Engineer with the concurrence of the RD prior to operating quarry sites by the Contractor. Such plan should be implemented prior to the end of the project</p>
Selection of Borrow Pits – Borrow pits should be selected with due regard to the natural geography of the area	The locations of the borrow pits shall be approved by, the Engineer and RD, and the Concerned Agencies. No borrow pit shall be located within five hundred meters of any protected area. The locations of the borrow pits shall be indicated within the Contractors SSEMP.
<b>Construction Phase:</b>	
Cut and Fill Requirement – During construction, to implement the designs, cut and fill will have to be performed. Such activities will cause considerable materials to be hauled from one place to another. The hauling of material will cause some of them to drop onto waterways and cause turbidity problems. Deposition areas will have to be sited properly and stabilized to prevent erosion. Erosion or washing away of materials can cause silt to get to the river and subsequently cause turbidity issue. It is anticipated that excess materials will be generated by the cut to provide for wider roadway and safer slopes	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> <li>• Temporary and permanent storage of materials should be confined to government owned land and in no circumstances should be dumped on agricultural or productive lands (without owner's written permission) or to any watercourse, including irrigation channels.</li> <li>• In the event of any spoil or debris from construction works being deposited in any of the aforementioned areas or any silt washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of the Engineer.</li> <li>• Deposition areas should be ascertained by the Contractor prior to cutting or excavations. Since the surrounding areas are somewhat uninhabited and open spaces, there are a good number of areas where materials can be deposited for the purpose of shaping and evening out the topography, fortifying embankments and riverbanks and toe protection of bridge structures.</li> </ul>
Quarries – Exploitation of materials from quarry will entail considerable disturbance of the existing topography. In rivers, gravel materials will be exhumed from the river bed and result in pit excavation. When not controlled properly will result in changing the flow of the river and subsequently erosion of the other banks of the	Should the Contractor decide to establish his own quarry, he will be responsible for the entire facility with respect to all permitting and environmental requirements. Prior to opening of any quarry or rock crushing facility, the Contractor will require approval from the relevant Concerned Agencies and the Engineer to ensure that land owners are adequately compensated for land use and that the sites are not located in

Project Potential Impacts on Topography	Recommended Mitigation Measures and Monitoring Activities
river. Operation of quarries by the Contractor will entail excavation of stone and gravel from the natural state followed by crushing to desired sizes with washing. The operations itself generates considerable noise. The crushing in dry condition generates dust while the washing produces silt-laden water which when discharged into the river will increase the turbidity of the water.	<p>an area likely to cause significant detriment to the local environment. To ensure that this is the case Contractors should ensure that quarries and crusher plants are:</p> <ul style="list-style-type: none"> <li>• Located at least 300 meters from urban areas to prevent noise and dust impacts;</li> <li>• Located outside of agricultural land; and</li> <li>• Where possible located on government owned lands.</li> <li>• Quarry area should be reinstated prior to the completion of the project.</li> <li>• Silt-laden water should be retained in sedimentation ponds to allow silt materials to settle; water-recycling should be considered to minimize turbidity in receiving waters.</li> </ul>
Borrow Pits – For road embankment and fill materials for bridge approaches, proper materials should be sourced from borrow pits. Extraction of earth materials result in pits of considerable depths which defaces the natural topography. In some occasions, deep excavations will pose hazard to people and animal that may traverse the area.	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> <li>• Pit restoration will follow the completion of works in full compliance all applicable standards and specifications.</li> <li>• Arrangements for opening and using material borrow pits will contain enforceable provisions.</li> <li>• The excavation and restoration of the borrow areas and their surroundings, in an environmentally sound manner to the satisfaction of the Engineer will be required before final acceptance and payment under the terms of contracts.</li> <li>• Additional borrow pits will not be opened without the restoration of those areas no longer in use.</li> <li>• Borrow pits should be reinstated prior to completion of the Project</li> </ul>
Use of other materials – is some cases substitute materials for embankment fill are suggested by the Contractor. Should this occur, the Engineer must provide guidelines to the Contractor inspect the site for any environmental issue and ask the Contractor to provide test results.	Alluvial material which will be excavated upstream from blocked culvert areas may be used as base material. This material shall be tested by the Contractor and Engineer for its suitability as base material before it may be used. The Contractor must use such material first before using any other quarry or borrow pit within 3 km from any such alluvial deposit.
<b>Post-Construction and Operations:</b> None	None

**Table 23: Existing borrow areas**

#	Existing borrow areas /quarries	License No.	Usable Quantity (m <sup>3</sup> )	Material
1	Qveda Tseva	100834	3 000	Sand-Gravel
2				Sand-Gravel
3	Qveda Tseva	100109	32 000	Sand-Gravel
4				Sand-Gravel
5	Marelisi		700 000	Limestone
6	Moliti		3 800 000	Limestone
7	Tsipi, km40		68 000 000	Diorite
8	Chumateleti		26 000 000	Granite
9	Khashuri	1001169	28 000	Sand-Gravel
10	Khashuri	100397	180 000	Sand-Gravel

235. The locations of the above listed identified material sources are shown on the attached borrow area location map in Appendix 10 of the Feasibility study main report.

### 3.2 Soil and Groundwater Quality Aspect

236. The Work along the road alignment will entail the use of trucks and heavy equipment for



various construction activities. To operate and run this machinery, petroleum fuel and lubricants will be brought to the site to service their requirements. In addition, maintenance works will also have to be done to keep them functional. In the course of the usage of these machinery, spills of petroleum products to the surrounding grounds are expected which will contaminate the soil and if seeps into the ground may contaminate groundwater and possibly surface water. The potential impacts and measures are presented below.

**Table 24: Project Potential Impacts on Soil and Groundwater Quality**

<b>Project Potential Impacts on Soil and Groundwater Quality</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b>	
Soil and groundwater contamination – Discharges of petroleum products directly onto the ground causes contamination of natural soil and would be treated as hazardous material. When allowed to continue unmitigated result into seepage of contaminants into the groundwater and cause groundwater contamination.	<p>To eliminate threat of ground and surface water pollution:</p> <ul style="list-style-type: none"> <li>• Ground water pollution is prevented by locating storage facilities for fuels and chemicals away from watercourses. In addition such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination.</li> <li>• No baseline measurements on ground water quality is required. To avoid contamination of any watercourse with sewage discharged from the Contractor's camp, a sewerage system will be established as it is described exemplarily in the chapter 4.3 "construction camp".</li> </ul>
<b>Construction Phase:</b>	
Contamination due to Spills or Hazardous Materials – Improper handling of hazardous materials can cause them to drop onto the ground which can result to soil contamination. Subsequently, given enough time, these materials can penetrate into the ground and reach the water table and result into groundwater contamination and pollution.	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> <li>• All fuel and chemical storage (if any) shall be sited on an impervious base within bund and secured by fencing. The storage area shall be located away from any watercourse or wetlands. The base and bund walls shall be impermeable and of sufficient capacity to contain 110 percent of the volume of tanks.</li> <li>• The construction camp maintenance yard shall be constructed on impervious Layer with adequate drainage to collect spills; there shall be no vehicle maintenance activities on open ground.</li> <li>• Filling and refueling shall be strictly controlled and subject to formal procedures. Drip pans shall be placed under all filling and fueling areas. Waste oils shall be stored and disposed of by a licensed contractor.</li> <li>• All valves and trigger guns shall be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use.</li> <li>• The contents of any tank or drum shall be clearly marked. Measures shall be taken to ensure that no contaminated discharges enter any soils.</li> <li>• No bitumen drums or containers, full or used, shall be stored on open ground. They shall only be stored on impervious Layer.</li> <li>• Areas using bitumen shall be constructed on impervious Layer to prevent seepage of oils into the soils.</li> </ul>
<b>Post-Construction and Operations:</b>	
Erosion – It is important that side slopes or roadside embankments are fully stabilized before the Contractor finally turns over the responsibility to the Client. Any issues within one year should be analyzed for proper remediation measures. Issues that will arise will be discussed between the Contractor and the Engineer, as Client's representative.	Contracts stipulated that the Contractor shall be liable for a one year defects liability period. During this year the Concerned Agencies should undertake regular observational monitoring of the Project Road to ensure that engineering works and vegetation growth have prevented erosion impacts. If the Concerned Agencies discover any potential issues they shall report their findings to the RD who shall then make the Contractor responsible for final improvements. Final payments cannot be made until outstanding issues are resolved

### 3.3 Surface Water Quality and Hydrology Aspect

237. The project road alignment runs close to Dzirula and Chkerimela rivers in most part of the low elevation regions. Thus, care should be exercise as any contaminants discharged along the road may result to contamination of the river. Earthworks when not performed properly may result to soil and debris dropping into the river and increasing the turbidity of the water. Also tributaries to the river will have to be equally protected from any contamination. These impacts and corresponding measures are as shown below

**Table 25: Project Potential Impacts on Water Quality**

<b>Project Potential Impacts on Water Quality</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b>	
Surface water contamination – The Contractor's work activities and facilities are the primary source of contamination. Discharges directly into the water or indirectly onto the ground that will finally find their pathways into the river will be the causes of contamination.	To eliminate threat of surface water pollution: <ul style="list-style-type: none"> <li>• Baseline measurement for Water Quality should be done by the Contractor in locations specified by the CS Consultant</li> <li>• Wastewater arising from camp site will be collected and treated.</li> <li>• Camp site location is at sufficient distance from any surface waters to avoid possible pollution. No water quality measurements are required.</li> </ul>
Adverse climatic conditions – Water crossing structures should sufficiently function well in adverse weather condition. Hence, design should adapt the possible and practical worst case scenario.	During design, all drainage works are designed based on the historical flood data and flood forecasting. A design discharge of 100-year return period is considered for culverts and bridges. The design of all structural components must conform to the design standards provided in the Employer's Special Requirements.
Bridge Construction – Bridge structural design should be made to provide sufficient service life.	To ensure safe and functional works: <ul style="list-style-type: none"> <li>• All new and widened bridges must be designed for the life expectancy of 75 years. The bridge rehabilitation and strengthening works must be designed for the life expectancy of 50 years.</li> <li>• The design loading and design of all structural components must conform to the bridge design standards provided in the Employer's Special Requirements.</li> <li>• Finally, the bridge design and layout must be aesthetically pleasing and in harmony with the existing environment.</li> </ul>
Drainage – Proper drainage design is important to maintain the structural integrity of the road and this would mean adaptable to worsening weather condition.	<ul style="list-style-type: none"> <li>• To ensure safe and functional drainage works, consideration in the design phase will be given to the issue of drainage and culverts to ensure that drainage patterns are improved from the existing conditions and that increased run-off does not occur or result in flooding of areas previously undisturbed.</li> </ul>
<b>Construction Phase:</b>	
Drainage and Flooding – The site should be well maintained and this includes establishing good drainage at work camps. This is important to maintain livable condition and sanitary place for workers,	During the construction phase the Contractor is required to construct, maintain, remove and reinstate as necessary temporary drainage works and take all other precautions necessary for the avoidance of damage by flooding and silt washed down from the Works.
Water Contamination issues at Construction Camps and Storage Areas - Waste water that will be generated at work camps due to a lot of people staying whether short-term or long term will contaminate the immediate surroundings which can harm both the man and ecosystem if no treatment is provided prior to discharge.	The Contractor shall ensure the following conditions are met: <ul style="list-style-type: none"> <li>• Wastewater arising on the site shall be collected and treated.</li> <li>• There shall be no direct discharge of sanitary or wash water to surface water. Disposal of materials such as, but not limited to, lubricating oil and onto the ground or water bodies shall be prohibited.</li> <li>• Liquid material storage containment areas shall not drain directly to surface water.</li> <li>• Lubricating and fuel oil spills shall be cleaned up immediately and spill clean-up shall be materials be maintained at the storage area.</li> <li>• Construction and work sites will be equipped with sanitary latrines that do not pollute surface waters.</li> <li>• Discharge of sediment-laden construction water directly into</li> </ul>

Project Potential Impacts on Water Quality	Recommended Mitigation Measures and Monitoring Activities
	<p>surface watercourses will be forbidden. Sediment laden construction water will be discharged into settling lagoons or tanks prior to final discharge.</p> <ul style="list-style-type: none"> <li>• Spill clean up equipment will be maintained on site. The following conditions to avoid adverse impacts due to improper fuel and chemical storage: <ul style="list-style-type: none"> <li>- Fueling operations shall occur only within containment areas.</li> <li>- All fuel and chemical storage (if any) shall be sited on an impervious base within bund and secured by fencing. The storage area shall be located away from any watercourse or wetlands. The base and bund walls shall be impermeable and of sufficient capacity to contain 110 percent of the volume of tanks.</li> <li>- Filling and refueling shall be strictly controlled and subject to formal procedures and will take place within areas surrounded by bunds to contain spills / leaks of potentially contaminating liquids.</li> <li>- All valves and trigger guns shall be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use.</li> <li>- The contents of any tank or drum shall be clearly marked. Measures shall be taken to ensure that no contaminated discharges enter any drain or watercourses.</li> <li>- Disposal of lubricating oil and other potentially hazardous liquids onto the ground or water bodies will be prohibited.</li> <li>- Should any accidental spills occur immediate clean up will be undertaken and all cleanup materials stored in a secure area for disposal to a site authorized for hazardous waste.</li> </ul> </li> <li>• If determined warranted by the Engineer, the Contractor shall provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from the sites. If so requested, the Contractor shall ensure that all vehicle are properly cleaned (bodies and tires are free of sand and mud) prior to leaving the site areas. The Contractor shall provide necessary cleaning facilities on site and ensure that no water or debris from such cleaning operations is deposited off-site.</li> </ul>
<p>Bridge Construction – Construction of bridges over perennial spring or river flow need to be considered properly. Building material and harmful substances may be discharged into the water that can contaminate the water and harm aquatic organisms.</p>	<ul style="list-style-type: none"> <li>• No pillars are drilled into the river for bridge construction. Bridges will be constructed by slabs only. Therefore generation of turbidity plumes and sedimentation which could impact aquatic organisms can be excluded. No impacts are expected on River ecology.</li> </ul>
<p><b>Post-Construction and Operations</b></p>	
<p>Impacts to hydrology and water quality as a result of construction activities - Concerns on water contamination and pollution arise when effluents and discharges leach into waterways and water bodies. It can be expected that with the construction of a better road the population will also increase and new settlements and villages will be established. With the increase in population and intensification of economic activities, wastewater from these establishments, if unmanaged and uncontrolled properly, will eventually cause pollution of existing water bodies. This will translate to adverse effects on the ecosystem and on the welfare of the people.</p>	<p>No negative impacts on ground and surface water resources are expected during post construction and operation.</p>

### 3.4 Air Quality Aspect

238. It is expected that the road work will generally be intermittent and not permanent in a specific site, and as such air quality impacts will be short term in specific locations. Short term emissions from machinery and trucks will be expected as well as dust from exposed work area, especially in dry seasons. Likewise, emissions will be expected on a longer-term from stationary sources such as quarries, borrow pits, asphalt plants and/or cement. Siting of these facilities where they can cause the least impact on human and ecologic receptors will be mandatory. Dust can come from quarries, borrow pits, haul roads, unpaved roads, exposed soils, uncovered dump trucks and material stock piles and may settle in residential areas and on productive crops, and may cause to some degree of respiratory stress for nearby residents. It is important that the Contractor will be advised on the following impacts and measures to be done.

**Table 26: Project Potential Impacts on Air Quality**

<b>Project Potential Impacts on Air Quality</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b>	
Generation of Dust – Spots cleared of vegetation, hauled embankments, excavations are exposed and in dry season will be sources of dust in the area and become an issue to the environment and to the local population.	<ul style="list-style-type: none"> <li>To suppress dust there shall be watering of unpaved haulage and transport routes during dry periods</li> </ul>
Emissions from equipment and facilities – Equipment, trucks and machinery will be the sources of emissions in the area. It is important to maintain the good quality of air in the surroundings.	To minimize emission: <ul style="list-style-type: none"> <li>All machinery and vehicles must be in good technical conditions</li> <li></li> </ul>
Air quality impacts from stationary sources – Stationary sources like asphalt and cement batching plants will generate emissions which are unusual in the area and degrade the pristine quality of air in the surroundings.	<ul style="list-style-type: none"> <li>Locations for quarry sites, borrow pits, asphalt and concrete batching plants must be approved by the Engineer and relevant agencies during the Pre-construction phase.</li> <li>Efforts should be made to ensure that these facilities are as near to the Project road as practical to avoid unnecessary trips and potential dust issues from vehicle movements during construction works.</li> <li>In addition, no quarry, borrow pit or asphalt plant shall be located within 300 meters of any urban area, protected area or sensitive receptor.</li> </ul>
<b>Construction Phase:</b>	
Open burning of waste materials – Contractor's burning of materials on site will contribute to fouling of air in the area	The Contractor shall ensure no burning of debris or other materials will occur on the Site without permission of the Engineer.
Fuel Emissions – the use of fuel will result in generation of contaminated emissions that can harm the ecosystem and result in illnesses to local population	Contractor shall ensure that no furnaces, boilers or other similar plant or equipment using any fuel that may produce air pollutants will be installed without prior written consent of the Engineer.
Exhaust emissions from the operation of construction machinery – the operation of machinery generate emissions that can harm the ecosystem and result in illnesses to local population	The Contractor shall ensure construction equipment shall be maintained to a good standard and fitted with pollution control devices. The equipment (including the pollution control devices) will be checked at regular intervals by the Engineer to ensure they are maintained in working order and the inspection result will be recorded by the Contractor & Engineer as part of environmental monitoring. In addition, the Contractor shall: <ul style="list-style-type: none"> <li>Discourage of the idling of engines;</li> <li>Prohibit of the use of equipment and machinery that causes excessive pollution (i.e. visible smoke) at project work sites;</li> </ul> Ensure material stockpiles being located in sheltered areas and be covered with tarpaulins or other such suitable covering to prevent

<b>Project Potential Impacts on Air Quality</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
	material becoming airborne.
Fugitive emissions from quarries, asphalt and cement batching plants – the operation of plants generate emissions that can harm the ecosystem and result in illnesses to local population	The Contractor shall ensure that conveyor belts at ancillary facilities (e.g. quarries) shall be fitted with wind-boards, and conveyor transfer points and hopper discharge areas shall be enclosed to minimize dust emission. All conveyors carrying materials that have the potential to create dust shall be totally enclosed and fitted with belt cleaners.
Dust generated from haul roads, unpaved roads, exposed soils and material stock piles – During construction some spots cleared of vegetation, hauled embankments, and excavations are exposed and in dry season will be sources of dust in the area and become an issue to the environment and to the local population.	<p>The Contractor shall ensure that the following dust suppression measures shall be instituted:</p> <ul style="list-style-type: none"> <li>• All trucks used for transporting materials to and from the site will be covered with canvas tarpaulins, or other acceptable type cover (which shall be properly secured) to prevent debris and/or materials from falling from or being blown off the vehicle(s);</li> <li>• Areas of reclamation shall be completed, including final compaction, as quickly as possible consistent with good practice to limit the creation of wind-blown dust.</li> <li>• Hard surfaces will be required in areas with regular movements of vehicles; and</li> <li>• Effective use of water sprays will be implemented (e.g., all roads within the construction areas of the Site shall be sprayed at least twice each day, and more if necessary to control dust to the satisfaction of the Engineer).</li> </ul>
<b>Post-Construction and Operations:</b>	
Air quality impacts from Vehicle movements – During the operations of the road, vehicles that will pass through the road will generate exhaust emissions.	Potential impacts due to the use of the new bridges and rehabilitated rural roads are the purview of RD.

### 3.5 Noise Generation Aspect

239. Generally, noise of the construction will be limited in active construction sites and can be short term. As in air quality, noise levels will be elevated on longer term in some sites to be operated by the Contractor. Siting for these noise generating facilities should be far enough from human and biological receptors so as not to cause considerable impacts to them. Below are a number of items that need to be guided on.

**Table 27: Project Potential Impacts by Noise**

<b>Project Potential Impacts by Noise</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Construction Phase:</b>	
Construction Noise and Vibration - Heavy equipment and trucks cause most of the noise in the construction sites, especially when they are out of proper maintenance. It is advisable that the Contractor reduce noise in the construction sites by proper scheduling of equipment, reduction of idling time, and adhering to authorized construction time (06:00 hrs. – 20:00 hrs). The Contractor's Noise Management Plan should be clarified with equipment operators and truck drivers to ensure minimization of noise impacts.	<p>The Contractor shall ensure provision of the following:</p> <ul style="list-style-type: none"> <li>• Source Controls, i.e., requirements that all exhaust systems will be maintained in good working order; properly designed engine enclosures and intake silencers will be employed; and regular equipment maintenance will be undertaken;</li> <li>• Site Controls, i.e., requirements that stationary equipment will be placed as far from sensitive land uses as practical; selected to minimize objectionable noise impacts; and provided with shielding mechanisms where possible;</li> <li>• Work near Sensitive Receptors shall be limited to short term activities as far as technically feasible;</li> <li>• Community Awareness, i.e., public notification of construction operations will incorporate noise considerations; methods to handle complaints will be specified. Sensitive receptors will be avoided as possible (i.e., aggregate crushers, operators, etc.). Disposal sites and haul routes will be coordinated with local officials;</li> <li>• Use of low volume charges will reduce the potential for vibration</li> </ul>

Project Potential Impacts by Noise	Recommended Mitigation Measures and Monitoring Activities
	induced damage to structures; and in the event of damage proven to be due to the contractor's activities, owners of structures will be fully compensated.
<b>Post-Construction and Operations</b>	
With the rehabilitation of the road, the vehicular traffic is expected to increase. Because of this, vehicular emissions and noise levels are anticipated to heighten.	When noise becomes excessive, signs can be used to notify drivers to maintain vehicles. However, when it becomes intolerable, noise barrier wall can be constructed.

### 3.6 Introduced Geo-Hazards Aspect

240. Cuts on mountain slopes to widen the carriageway for safe passages of traffic will be necessary in some spots. During construction itself workers will be exposed to short term risks and hazards while during operation such hazards and risks will be there for a long term. Considerations on these aspects are recognized with the following impacts and measures.

**Table 28: Project Potential Geo-Hazard Impacts**

Project Potential Geo-Hazard Impacts	Recommended Mitigation Measures and Monitoring Activities
<b>Design and Pre-Construction:</b>	
River Bank / Road Edge Erosion – For general safety the road should be designed to be resilient to erosion as this is important for the sake of the motorist, the local population and the environment.	<p>To reduce the impacts of erosion, the Detailed Designs shall ensure:</p> <ul style="list-style-type: none"> <li>• The side slopes of embankments will be designed to reflect soil strength and other considerations as included in the project specifications in order to reduce slips or erosion;</li> <li>• Requires measures to provide retaining or reinforcing structures which allow the construction of a very steep nearly vertical slope on the downhill side. This can be done by building a retaining wall which will be backfilled or a mechanical stabilized (reinforced) earth structure;</li> <li>• For the relatively localized erosions on the road edges building of a retaining structure with gabions is proposed as the most suitable solution. To build up the eroded slopes and reinstate the road shoulder and verge the following measures are proposed: <ul style="list-style-type: none"> <li>– Excavations of part of the existing road down to a level where the full width of the road can be establish;</li> <li>– Building a retaining structure with gabions, height depending on the local situation, a geo-textile has to be placed behind the gabions to avoid washing out of fine material;</li> <li>– Backfill behind gabion, preferable granular material compacted.</li> </ul> </li> <li>• Install road side ditch or drain on the opposite road side at the toe of the uphill slope including a subsurface drainage.</li> <li>• For embankments greater than 6m, stepped embankments will be used</li> <li>• Prescribe planting of indigenous tree species to stabilize the slope.</li> </ul>
Mud and Landslide – Due to excessive moisture, landslide can occur. As such this will be safety and environmental issue.	<p>To reduce the impacts of mud and landslide, the Detailed Designs shall ensure:</p> <ul style="list-style-type: none"> <li>• The construction of road side drainage and where required a low gabion wall will in most cases prevent any danger to the road;</li> <li>• Prescribe planting of indigenous tree species to stabilize the slope</li> </ul>
Rock/Stone Fall – Any instability on rocky area can result to falling of rocks and stones. As such this will be safety and environmental issue.	<p>To reduce the impacts of rock/stone fall, the Detailed Designs shall ensure:</p> <ul style="list-style-type: none"> <li>• Cutting back of the side slope face as required by the design providing the needed road width.</li> <li>• The new slope should be benched from a height of about 5.0 to 6.0m where feasible;</li> <li>• Removing loose stones and boulders from the surface during cutting operation and construction;</li> </ul>

Project Potential Geo-Hazard Impacts	Recommended Mitigation Measures and Monitoring Activities
	<ul style="list-style-type: none"> <li>• Construct road side drainage at the toe of the new slope including subsurface drainage;</li> <li>• Prevent surface water from running down the slope by implementing drainage measures on top of the slope like cut off drains if feasible. Constructing a drainage channel on the uphill side of the road will prevent future potential erosion of the downhill road edge;</li> <li>• The new slope should be cut to an inclination which is a little less than the existing slope. This together with benching will increase the stability of the slope;</li> <li>• In areas prone to landslides and for construction of slopes attention has to be paid that according the Building Norms and Rules of “Earthquake-resisting construction” (PN 01.01-09) of October 7, 2009 of the Minister of Economic Development of Georgia, the study territory is included in the zone of 8-point earthquake intensity;</li> <li>• Prescribe planting of indigenous tree species to stabilize the slope.</li> </ul>
<p><b>Construction Phase:</b></p> <p>Slope Stabilization – Following the design, the Contractor should implement the works in a proper manner.</p>	<p>The Contractor shall be responsible for the following:</p> <ul style="list-style-type: none"> <li>• Final forming and re-vegetation will be completed by the Contractor as soon as possible following fill placement to facilitate regeneration of a stabilizing ground cover;</li> <li>• Trenching will be used where necessary to ensure successful establishment of vegetation;</li> <li>• Seeding with a fast growing crop and native seed mix will occur immediately after fill placement to prevent scour and to encourage stabilization;</li> <li>• Construction in erosion and flood-prone areas will be restricted to the dry season.</li> </ul>
<p>Erosion – Correct implementation of designs is important to eliminate the occurrence of erosion.</p>	<p>The Contractor will be responsible for ensuing:</p> <ul style="list-style-type: none"> <li>• Material that is less susceptible to erosion will be selected for placement around bridges and culverts;</li> <li>• Re-vegetation of exposed areas including; (i) selection of fast growing and grazing resistant species of local flora; (ii) immediate re-vegetation of all slopes and embankments if not covered with gabion baskets; (iii) placement of fiber mats to encourage vegetation growth, although due to the arid conditions in most of the road, this may only feasible where there is regular rainfall or other natural water supply.</li> </ul>
<p><b>Post-Construction and Operations:</b></p>	
<p>Continuous presence of Geo-hazards – All roads need monitored for functionality and stability. Any occurrence of geo-hazard can render the road impassable.</p>	<p>For general safety, geo-hazards should be continuously monitored and measures should be performed to prevent any untoward incident.</p>

### 3.7 Bridges and Waterways

241. For the most parts of the road, the river runs parallel to the road and in a number of places, the river will be crossed over by bridges that will be constructed or rehabilitated. Gullies with perennial or seasonal stream flows will also be crossed by rivers or box culvert. Drainage works to capture runoff will also have to be constructed along the road to safely channel them to outfalls onto the river. With these infrastructural works, the associated impacts to be considered are as follows:

**Table 29: Project Potential Impacts by Bridges and Waterways**

<b>Project Potential Impacts by Bridges and Waterways</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Construction Phase:</b>	
Demolition of existing structural components – In the case of bridge rehabilitation, certain components will have to be demolished and such activities would result to bridge fragments to dropping into the water. Excavation works for foundations – bridge foundation will entail coffer-damming or diversion of water flow. Such activities will entail filling around the area to excavate. Soil disturbances and earthworks will cause loose soil materials to be washed away by the flow and result in turbid water. Likewise, to enable casting of concrete, dewatering activities will have to be done which can also cause the water to be turbid. Construction of superstructure – concreting of bridge piers and casting or setting out of bridge girders and decks will entail formworks and supports to be erected, and actual pouring of concrete. The dropping of any material debris into the water can be a major cause of water contamination.	No pillars are drilled into the river for bridge construction. Bridges will be constructed by slabs only. Therefore generation of turbidity plumes and sedimentation which could impact aquatic organisms can be excluded. No impacts are expected on River ecology.  The Contractor shall ensure provision/or performance of the following: <ul style="list-style-type: none"> <li>Contractor should provide additional measures to catch debris from falling into the river;</li> <li>Structural elements should be casted far from the river to prevent concrete mix from getting into the water.</li> </ul>
<b>Post-Construction and Operations</b>	
None	None

### 3.8 Processing Plants and Campsites

242. Considering that the area is mainly rural and naturally vegetated area, processing plants, e.g. as concrete batching plants and asphalt plants, and contractor's camp will be major sources of impacts to the surroundings associated with their operations. It is important that the Contractor be alerted of the following impacts by these facilities:

**Table 30: Project Potential Impacts by Processing Plants and Campsites**

<b>Project Potential Impacts by Processing Plants and Campsites</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b>	
Specifying locations for Processing Plants and Campsites – The design engineer should establish clear guidelines for the siting and operations of these facilities	To minimize impacts to communities and natural surroundings: <ul style="list-style-type: none"> <li>The contractor shall submit Site Specific Environmental Management Plan (SSEMP) for approval (short statement and site plan in appropriate scale) by the Engineer and the involved agencies for obtaining the required permits for camp site facilities.</li> </ul>
<b>Construction Phase:</b>	
The facilities shall be operated mostly during the construction phase and will cause the following issues: <ul style="list-style-type: none"> <li>Water contamination in nearby waterway</li> <li>Air Quality and noise issues during plant operations</li> <li>Contaminated effluents caused by waste water</li> <li>Defacement of the topography by the siting of these facilities</li> <li>Resource Competition with village residents on local resources such as water, power, food supply</li> </ul>	The Contractor shall ensure provision/performance of the following: <ul style="list-style-type: none"> <li>Reinstatement plan should be conceptualized by the Contractor for their proposed site and submitted to the contractor;</li> <li>Camp site will be located at sufficient distance to any watercourse. Therefore no impacts on water are expected.</li> <li>Dust and noise will be monitored at identified sensitive receptors as indicated in the Environmental Monitoring Table.</li> <li>Complaints from communities should be properly and promptly responded to;</li> </ul>
<b>Post-Construction and Operations</b>	
None	None



### 3.9 Transportation of Construction Materials and Wastes

243. In order to maintain the same environmental condition of the project area, the Contractor should consider also the possible impacts of the transporting of construction materials and wastes.

**Table 31: Transportation of Construction Materials and Wastes**

<b>Project Potential Impacts by Processing Plants and Campsites</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b>	
Specifying locations manner of transporting materials into the worksites – The design engineer should establish clear guidelines for transporting construction materials	To minimize impacts to communities and natural surroundings: <ul style="list-style-type: none"> <li>Local road and community regulations should be adhered to</li> </ul>
<b>Construction Phase:</b>	
The transport of construction materials and waste may result in the following: <ul style="list-style-type: none"> <li>Droppings of materials to be brought to the site can become community and motorist hazards</li> <li>Droppings of waste will result to spot contamination and possibly pollution of the natural surroundings.</li> <li>Spills from haul trucks can be source of ecological, biological and socioeconomic harm in the area.</li> <li>Dust from uncovered trucks can cause health problems to the people</li> </ul>	The Contractor shall ensure provision/performance of the following: <ul style="list-style-type: none"> <li>Liquids transported to or from the sites should be placed in sealed containment;</li> <li>Soil, gravel and stone should be covered with tarp or any material that can effectively prevent the dropping;</li> <li>Drivers should abide by safe driving practices, especially through communities;</li> <li>Driver and Contractor's personnel should ensure that materials are being safely loaded, hauled and unloaded.</li> <li>Emergency spillage and clean-up procedure should be drafted by the Contractor and approved by the Engineer</li> </ul>
<b>Post-Construction and Operations</b>	
None	None

### 3.10 Biological Aspect

244. Along the road, the floral species thriving are not considered very sensitive since farmlands and residences also were established by the local population. In some spots a number of important plant species may exist. In addition, faunal species as most are reclusive species may not frequent the road area. Should the Contractor have chance of locating and sighting of any important floral and wildlife species, the following items will have to be adhered to.

**Table 32: Project Potential Impacts on Biological Resources**

<b>Project Potential Impacts on Biological Resources</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b>	
Impacts on Trees and other vegetations – in the design, it is important to avoid affecting trees when possible	There is a widening of 20 -25 km out of fifty km. With the detailed design completed a minimum number of trees need to be felled. The trees will be marked. The contractor will liaise with forest department if there is a licence required.  In principal the Contractor should plan to avoid loss of trees where possible and should employ techniques such as asymmetrical widening. Where trees must be felled, the Contractor shall ensure that each one removed should be replaced by at least two new saplings of the same species or other at suitable locations, all as designated by the tree owner,
Impacts on wildlife - in the design, it is important to avoid	Designs shall ensure that there will not be any impact to wildlife through adequate survey of the area. No impact on BKNP is expected due to sufficient

<b>Project Potential Impacts on Biological Resources</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
affecting wildlife and their habitats	distance of the Project road.  Contractor to report to the Engineer any sighting of wildlife in the project sites.
<b><u>Construction Phase:</u></b>	
Loss of flora	The Contractor shall ensure the following conditions are met: <ul style="list-style-type: none"> <li>Each tree removed by the Contractor should be replaced by at least two new saplings of the same species or other at suitable locations, all as designated by the tree owner. Tree translocation should be explored and done whenever feasible. Dead saplings should be replaced as soon as possible. No trees should be cut in the area without written permission from the Engineer.</li> <li>Supplying appropriate and adequate fuel in workers' camps to prevent fuel-wood collection from unauthorized sources.</li> </ul>
Impacts to Fauna – The existing water bodies (river, creeks, gullies, lakes, ponds, canals and ditches) along the project road should be given special consideration as they could be habitats of faunal species.	Work crews should be alerted that faunal species should not be killed and be allowed to escape during work execution. At best, disturbance should be in such a way as to provide enough escape corridor to allow for animals to move on their own. Should animals be unintentionally be trapped in the work area/s, workers should find ways to enable these animals to escape unharmed.
<b><u>Post-Construction and Operations:</u></b>	
Impacts to Fauna – Passing vehicle may encounter fauna along the road	Motorist should be notified by road signs of their possible presence and prohibit harming them

### 3.11 Sensitive Areas Aspect

245. The Borjomi-Kharagauli National Park is located around a distance of 2-3 km south of the road, 170m higher than the road, and is opposite of the Chkherimela River at km 35. The river and the high elevation serve as natural buffer from the road. Nevertheless, because of its local and international importance, certain guidelines on impacts and measures need to be adhered to as follows:

**Table 33: Project Potential Impacts on Sensitive Areas**

<b>Project Potential Impacts on Sensitive Areas</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b><u>Design and Pre-Construction:</u></b>	
Impacts on wildlife habitats – the BKNP is an important local and international park and should be protected.	Due to sufficient distance of the Project road there will be no impact on the BKNP.
<b><u>Construction Phase:</u></b>	
Protecting BKNP – It is important that construction activities do not affect the BKNP	Entry to the BKNP should be denied without approval of the MoENRP
<b><u>Post-Construction and Operations:</u></b>	
Protecting BKNP – It is important that the operations of the do not affect the BKNP	Motorist should be notified by road signs of their proximity to BKNP.

### 3.12 Construction and Domestic Waste

246. Both construction and domestic wastes are generated at the worksite and campsite. Proper management of these wastes should be performed by the Contractor. The following are the impacts and measures regarding waste management:

**Table 34: Construction and Domestic Waste**

<b>Project Potential Impacts on Community Safety</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b><u>Design and Pre-Construction:</u></b>	
Waste Management – Proper establishment of waste management system is important to protect the environment and maintain healthy living conditions for the workers	<p>The SSEMP will address any waste management issues. Waste and recyclable will be disposed of by the contractor in a controlled manner in accordance with the Georgian legislation and following these general procedures:</p> <ul style="list-style-type: none"> <li>• Identification</li> <li>• Classification</li> <li>• Correct handling (including bagging if necessary)</li> <li>• Correct storage/segregation</li> <li>• Correct disposal/re-use/recycling</li> <li>• Documentation</li> </ul> <p>Where feasible the contractor will arrange the temporary integration of waste collection from work sites into existing waste collection systems and disposal facilities of nearby communities. This shall be taken into consideration when deciding the place for the camp. If this is not possible disposal of waste shall be conducted by an approved company.</p>
<b><u>Construction Phase:</u></b>	
Waste in Construction Camps and other ancillary facilities – Waste generated should be managed properly so as not to contaminate the surroundings	The Contractor will be required to coordinate all construction camp activities with neighbouring land uses. The Contractor shall also be responsible to maintain and clean-up campsites and respect the rights of local landowners. If located outside the RoW, written agreements with local landowners for temporary use of the property will be required and sites must be restored to a level acceptable to the owner within predetermined time period.
Spoil – Proper management of spoils or excess soil should be done. Since the worksite is near river, unplanned dumping of spoil may lead to contamination of the river.	Under no circumstances shall the Contractor dump excess materials on private lands without permission of the owner and approval from the Engineer. In addition, excess spoil shall not be dumped or pushed into rivers at any location unless in low volumes and agreed upon with the Engineer and with approval from the Concerned Agencies.
Inert Solid & Liquid waste – Improper management of such waste will result in contamination of the soil and water resources in the area.	<p>The contractor shall be responsible for the following:</p> <ul style="list-style-type: none"> <li>• Provide refuse containers at each worksite;</li> <li>• Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal;</li> <li>• Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process; and</li> <li>• Collect and transport non-hazardous wastes to all approved disposal sites. The sites for waste disposal shall be agreed with the local municipal authorities and Concerned Agencies. A specialized company may be contracted, if available to ensure collection of domestic and general waste from camps and temporary storage areas and transportation to landfills approved and licensed by the Concerned Agencies.</li> </ul>
<b><u>Post-Construction and Operations:</u></b> None	None

### **3.13 Worker's Safety Aspect**

247. Worker's safety during construction is important. Health and safety at workplace and during execution of work should be among the Contractor's work policy. The following items address overall worker's safety which is necessary to be considered by the Project.

**Table 35: Worker's Safety Aspect**

Project Potential Impacts on Community Safety	Recommended Mitigation Measures and Monitoring Activities
<b>Design and Pre-Construction:</b>	
Provision of PPE – Workers should be adequately protected when performing work at the site	<p>For health and safety protection of workers the following shall be provided:</p> <ul style="list-style-type: none"> <li>adequate health care facilities (including first aid facilities) within construction sites;</li> <li>training of all construction workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work;</li> <li>personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with legal legislation;</li> </ul>
Workers Safety Awareness – Workers should know the risks and hazards of the job and should be advised and reminded accordingly	<p>The contractor shall hire a qualified health and safety expert who will provide safety training to the staff according to the requirements of the individual work place. Prior to the commencement of works, the work site personnel shall be instructed about safety rules for the handling and storage of hazardous substances (fuel, oil, lubricants, bitumen, paint etc.) and also the cleaning of the equipment. In preparation of this the contractor shall establish a short list of materials to be used (by quality and quantity) and provide a rough concept explaining the training / briefing that shall be provided for the construction personnel.</p>
HIV/AIDS Awareness – This is a basic requirement for ADB funded project	<p>Technical Specifications should instruct Contractor to provide HIV/AIDS Awareness Seminars to his workers; accordingly, the Contractor should contractually require all of his Sub-contractors to provide HIV/AIDS Awareness Seminars to their workers. This will include provision of all the paraphernalia, etc. to all workers</p>
<b>Construction Phase:</b>	
Worker Health & Safety – Risks and hazards of work are real day-to-day occurrence. Hence, health and safety should be taken seriously for the general welfare of the workers.	<p>The Contractor shall be responsible for provision of:</p> <ul style="list-style-type: none"> <li>Safety Training Program. A Safety Training Program is required and shall consist of an Initial Safety Induction Course. All workmen shall be required to attend a safety induction course within their first week on Site and Periodic Safety Training Courses.</li> <li>Safety Meetings. Regular safety meetings will be conducted on a monthly basis and shall require attendance by the safety representatives of Subcontractors unless otherwise agreed by the Engineer.</li> <li>Safety Inspections. The Contractor shall regularly inspect, test and maintain all safety equipment, scaffolds, guardrails, working platforms, hoists, ladders and other means of access, lifting, lighting, signing and guarding equipment. Lights and signs shall be kept clear of obstructions and legible to read. Equipment, which is damaged, dirty, incorrectly positioned or not in working order, shall be repaired or replaced immediately.</li> <li>Safety Equipment and Clothing. Safety equipment and protective clothing are required to be available on the Site at all material times and measures for the effective enforcement of proper utilization and necessary replacement of such equipment and clothing, and all construction plant and equipment used on or around the Site shall be fitted with appropriate safety devices.</li> <li>First Aid facilities. A fully equipped first aid base shall be climatically controlled to maintain the temperature of the inside of the building at 20 degrees C. Arrangements for emergency medical services shall be made to the satisfaction of the Engineer.</li> </ul> <p>The Contractor shall coordinate with local public health officials and shall reach a documented understanding with regard to the use of hospitals and other community facilities.</p>
Sub-contractor's / Suppliers EMP Compliance – As part of the work force in the project, the sub-contractors should be instructed and contractually compelled to	<p>All sub-contractors/ suppliers will be supplied with copies of the SSEMP. Provisions will be incorporated into all sub-contracts to ensure the compliance with the SSEMP at all tiers of the sub-contracting. All sub-contractors will be required to appoint a safety representative who shall be available on the Site throughout the operational period of the respective sub-contract unless the</p>

<b>Project Potential Impacts on Community Safety</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
comply with the EMP.	Engineers approval to the contrary is given in writing. In the event of the Engineers approval being given, the Engineer, without prejudice to their other duties and responsibilities, shall ensure, as far as is practically possible, that employees of subcontractors of all tiers are conversant with appropriate parts of the SSEMP.
HIV/AIDS Awareness - approved Service Provider should perform the awareness seminar to the workers for greater effectiveness.	The Contractor shall subcontract with an Approved Service Provider to provide an HIV/AIDS Awareness Program to the Contractor's Personnel and the Local Community as soon as practicable after the Contractor's Personnel arrive at the Site but in any case within two weeks after the Contractor's Personnel arrive at Site and to repeat the HIV/AIDS Awareness Program at intervals not exceeding four months. All workers should be provided with HIV/AIDS paraphernalia and should have access to such at all times.
<b>Post-Construction and Operations:</b> None	None

### 3.14 Community Safety Aspect

248. Community safety has to be maintained during construction and a program for traffic safety needs to be continued during its operations. Below are the impacts and measures concerning over all community safety

**Table 36: Project Potential Impacts on Community Safety**

<b>Project Potential Impacts on Community Safety</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b>	
Community awareness for Safety – Local people safety should be upheld and maintained	For community wealth and safety it shall be made sure that <ul style="list-style-type: none"> <li>• drinking water demand will not compete with adjacent communities;</li> <li>• there shall be adequate protection to the general public, including safety barriers and marking of hazardous areas;</li> <li>• there shall be safe access across the construction site to people whose settlements and access are temporarily severed by road construction;</li> </ul>
Safety to Motorist and pedestrians – Construction sites should be made safe for all passing vehicles	The traffic safety issues shall be accounted for during the design phase of the Project, they including incorporation of: <ul style="list-style-type: none"> <li>• Safety barriers</li> <li>• Traffic signs</li> <li>• Road Crossings</li> <li>• Speed Bumps</li> <li>• Speed limits</li> </ul> Contractor to prepare Traffic Management Plan (TMP) as part of the SSEMP.
<b>Construction Phase:</b>	
Traffic Safety – To enable traffic to be unimpeded even during construction traffic safety is the responsibility of the Contractor.	It is important that truck drivers and equipment operators understand the importance of maintaining road safety especially at road junction points. Village access likewise should be accorded due focus for the safety of the general population, especially children, and farm animals. Proper coordination with the village should be done to effect road safety. Checking of safety aspects should be done continuously with safety reminder meetings and done regularly. Safety traffic signs and warning lights should be installed at appropriate locations; and flagmen should be assigned at critical spots. Monitoring of this aspect can be conducted jointly by the Contractors' management and the Construction Supervision personnel.

Project Potential Impacts on Community Safety	Recommended Mitigation Measures and Monitoring Activities
	<p>Truck drivers and equipment operators must be made to understand the importance of maintaining road safety especially at road junction points and along village roads for the safety of the general population, especially children, and farm animals. Proper coordination with the village leaders should be done to effect road safety. Checking of safety aspects should be done continuously with safety reminder meetings conducted regularly. This can be a joint activity of the Contractors' management and the Construction Supervision personnel.</p> <p>To minimize Risks at Railroad Crossing – Safety concerns at railroad crossing should be among the important focus of the Contractor. It will be important that the Contractor should ensure that impacts be minimized if not avoided to the railway operations as well as provide more safety measures in the surroundings. Method Statements should be submitted well in advanced for the evaluation of the Engineer.</p>
Road closures, existing bridge closure, diversions and blocking of access routes, or during blasting of rocks –Normal and safe access of the local population should be maintained during construction and access roads regularly maintained.	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> <li>• He shall be responsible for provision of all road diversion signs and ensure that diversion roads do not impact negatively upon private lands.</li> <li>• Any diversions shall be agreed upon by the Engineer.</li> <li>• At locations where solid rock will be encountered and mechanical breaking is not feasible the Contractor shall use hydraulic blasting or rock splitter. This has the advantage of no vibration, no dust, no noise, no flying rock splitter or other impacts on environment, buildings or persons. In addition to conventional blasting hydraulic blasting/rock splitting requires no special permission</li> <li>• Notices of delays, due to blasting (if any), shall be posted in villages within ten kilometers of the blasting area so villagers can plan their travel times accordingly.</li> <li>• The Contractor should make blasting at a regular period in the day so that the population in the valley becomes aware of the most likely delay periods.</li> <li>• The Contractor shall be responsible for ensuring that all access routes are kept open during Project works for at least 50% of the day during construction works and 100% of the time after construction works are completed for the day. Any temporary existing bridge closure should be communicated to affected people ahead of time</li> </ul>
Electrical Systems – Safety in relocating them is important	During construction the Contractor shall ensure that all power lines be kept operational, this may include the provision of temporary transmission lines while existing poles and lines are moved. The only exception to this item will be during periods of blasting when HV power lines will be switched off for safety.
<b>Post-Construction and Operations:</b>	
Traffic Safety – Road traffic safety should be enforced to avoid vehicular accidents	<p>Traffic regulations should be enforced at all times</p> <p>Traffic safety measures should be performed</p> <p>Regular maintenance should be done</p>

### 3.15 Socio-cultural Aspect

249. Monuments along the road as well as any archeological finds need to be preserved. Since this part Georgia somehow was historically prominent, it is important that the Contractor should be well advised of any impact that will have bearing on the cultural, historical and archaeological heritage in the area. The following are important guidelines concerning preservation of heritage vis-à-vis the project.

**Table 37: Project Potential Impacts on Socio-Cultural Resources**

<b>Project Potential Impacts on Socio-Cultural Resources</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b>	
Impacts to Cultural Historical and Archaeological Sites and Monuments – Cultural resources are considered heritage treasures and must be protected.	Designs shall ensure that there will be no significant encroachment to any existing cultural/historical monuments or archaeological site that will eventually be discovered during Detailed Design. Opportunities should be explored to enhance their attributes.
<b>Construction Phase:</b>	
Impacts to Cultural, Historical and archaeological areas – As people's heritage treasures these areas should be protected and even enhanced for the enjoyment of the people	To avoid potential adverse impacts to cultural, historic and archaeological resources, the Contractor shall: <ul style="list-style-type: none"> <li>• Instruct his personnel to work with care near cultural monuments;</li> <li>• In the event of unanticipated discoveries of cultural or historic artifacts (movable or immovable) in the course of the work, the Contractor shall take all necessary measures to protect the findings and shall notify the Engineer and the Concerned Agencies. If continuation of the work would endanger the finding, project work shall be suspended until a solution for preservation of the artifacts is agreed upon.</li> </ul>
<b>Post-Construction and Operations:</b> None	None

### 3.16 Impact to Households

250. Impacts to households by the construction of the road, especially those living along the road or whose main access to and from their homes or farmlands would be significant. This can range from direct effects to their health to indirect effects to their livelihood. Although the duration may vary from individual households, the general impacts are expected to be experienced by the households in one form or another.

**Table 38: Project Potential Impacts on Households**

<b>Project Potential Impacts on Households</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b> None	None
<b>Construction Phase:</b>	
Impairment of access – since the road is the primary infrastructure link, the households will generally experience difficulty of access from and to their homes, places of work or sources of livelihood	During construction, access should be maintained by providing temporary detour, by-pass or diversion paths for vehicles and people in the area. This should be with proper notification and consultation with the local population
Livelihood Impact – in some cases, since the road would be partly or entirely, unusable during construction, some livelihood of the household would be affected especially those relaying with mobility of goods from and to production area.	
Hampered Mobility – the household's mobility are hampered during construction ranging to stoppage to increase in travel time, heightened difficulty	
Health and Nuisance – Due to generation of dust and noise from the construction activities, the household will be at risk associated with respiratory issues and noise, vibration and blasting (if any) nuisance.	Suppression of dust by regular spraying of soil at the site will be necessary. Noise should be minimized by equipping equipment with mufflers and proper maintenance. Usage of equipment should be scheduled in order to minimize noises. Blasting, if to be done, should be properly announced and safety measures to the people be implemented.
Potential Employment difficulty – one possible good effects of the road construction will be	To further increase the benefit, the Contractor should be encouraged to hire local labour, including women in the 14

<b>Project Potential Impacts on Households</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
availability of employment in the construction by the Contractor	villages.
<b>Post-Construction and Operations:</b> None	None

### 3.17 Other Socio-economic Concerns

251. One of the important issues in the road project is the aspect of compensation. Considerable numbers of land plots would be affected due to widening of the roadway in some areas to enable safe passage of two-way traffic. In order to minimize social impact, the proper compensation framework should be implemented as presented here:

**Table 39: Project Potential Impacts on Socio-Economic Concerns**

<b>Project Potential Impacts on Socio-Economic Concerns</b>	<b>Recommended Mitigation Measures and Monitoring Activities</b>
<b>Design and Pre-Construction:</b>	
Loss of Property and Land – some lands will have to be expropriated for the widening of the road; hence, people's land would be reduced	In such circumstances necessary, the RD must prepare the Land Acquisition and Resettlement Plan (the LARP), obtain the approval of ADB and then implement the plan and acquire the land prior to the start of Pre-construction activities.
Loss of Land for Agricultural Production – Those formerly being used for agriculture will now be part of the road.	The Engineer shall ensure that all appropriate LARP measures have been taken by the RD before any alteration or destruction of agricultural land by the Contractor.
<b>Construction Phase:</b> None	None
<b>Post-Construction and Operations:</b> None	None

252. Since to some distance from the road especially those upper regions are the only ones vegetated, timber industry does no longer exist. In some cases, it can happen that local people would cut trees for their own household use, such activity also is not allowed by the local government. Nevertheless, to discourage cutting of trees, information campaigns and patrolling of the area will be necessary. During construction, the Contractor will be prohibited from cutting or harming trees.

### 3.18 Cumulative Impacts

253. Cumulative impacts can be described as the combined changes of environment that are the result, not only of a single project, but of all human activities, past, present and future (as far as it is foreseeable) in the study area. It thus integrates the identified impacts of all ongoing planning schemes in the Project Area of Influence and analyses the social and environmental implications.

254. As an example the impacts associated with the implementation of contractor's yard are assessed. Cumulative impacts may arise regarding the potential spread and increase of transmissible diseases due to a significantly larger workforce within the Project area of influence when other planning activities are realized at the same time.

255. There are also positive cumulative impacts when considering both Project phases and their ancillary facilities like increased spending capacity.

256. In general it can be concluded that most of the identified Project specific impacts, positive and negative, will aggravate when assessed together with other activities in the Project area. This is because additive, multiplicative and synergetic effects might occur.



## **G. Analysis of Alternatives**

### **1. Type of Project**

257. The project will primarily be a rehabilitation and reconstruction of road along the existing alignment between Dzirula and Chumateleti consisting of (i) pavement works – replacement and/or construction of new pavement structure; (ii) bridged construction – mostly replacement of old bridges with new bridge structure and introducing new ones; (iii) culverts and drainage works – replacement of old culverts and improvement of existing ones with installation of side ditches; (iv) road curvature improvements – for improve drivability and safety, curvatures and gradients will be improve, especially at existing narrow curves; (v) carriage way widening – in a number of spots the road width will be widened to allow for safe two-way traffic, and pedestrian access; (vi) slope cuts – due to necessary widening and safety; (vii) slope stabilization – cuts will be stabilized by structural works; and (viii) installation of road furniture – necessary safety features and furniture shall be installed at strategic locations along the road.

258. The road is envisioned to have a design speed of 40kph with pavement most probably asphalt concrete. In a progress meeting with the Roads Department and ADB mission team, it was expressed by their desire to see also the cost for cement concrete pavement as comparison to asphalt concrete pavement. The envisioned service life of the pavement based traffic load forecast is set at 20 years, with the normal routine and periodic maintenance.

259. The road, when completely rehabilitated and reconstructed, shall fully and efficiently function either as a local road to service the population within the area or/and serve as a strategic alternative for through- traffic alternate road to the E60 – Rikoti Tunnel route.

260. The chosen alignment remains on the existing alignment over its whole length and no spatial variants were investigated. However in order to reduce the environmental and social impacts and also in order to improve driving comfort and safety on the new road deviations from standard were analyzed at certain locations.

261. During the field visit an agreement with the Roads Department was reached on the design parameter for the critical locations, where the desired minimum parameter in accordance to the Georgian design standard could not be maintained. The agreed solutions at the critical locations are shown in the Table 20 of the Feasibility Study report.

262. Regarding the applied standards the following design philosophy was applied.

- The standards to be applied will follow the Georgian geometric design standard for the selected design speed of 40 km/h, with some flexibility in application when the strict application of the standards would result in an excessively costly technical solution.
- In general the design follows the existing alignment wherever possible and considers the existing structures. Where the existing alignment does not correspond to the proposed parameters, certain improvements depending on topography, build-up areas and structures are consider.
- The vertical alignment has been maintained in general, with improvements to the sight distances, where the existing topography allow for improvements. To accommodate new pavement layers, the road elevations have increased accordingly where possible.

- The design will result in a cost effective construction, considering the low traffic volumes on the road and the economic viability of the design.

## **2. Need for the Project**

### **2.1 Country and Regional Strategy**

263. The rural areas in Georgia are generally characterized by high unemployment and poverty.<sup>7</sup> It was pointed out that among the primary causes of such condition is the fact that more than 70% of Georgian secondary roads are in poor condition; thus, reducing freight and passenger transport services in some rural areas. Improvement of the secondary road network is clearly one of the key issues to reduce poverty in the rural areas of the country. The project is consistent with the government's policy to invest more to fund for the improvement of secondary roads.

264. The current road condition in majority of its stretch is in deplorable state with numerous sections now irreparable and impassable during rain and snow. As such it can no longer fully and efficiently function either as a local road or a strategic alternative for through traffic to E60, which is a vital connectivity between west and east Georgia.

265. With better access to one of Georgia's nature parks, the Borjomi-Kharagauli Nature Park, more and more visitors will come to enjoy its pristine beauty. Access to the area will be better ensured even during winter months allowing more business to tourism sector. With this the country's national tourism will be develop further to become of the primary drivers of progress to the country

### **2.2 Locality Specific Rationale**

266. On the local perspective considering the Imereti Region and Sidha Kartli Region along with the adjacent ones, the following are considered the local benefits:

- The project road between Dzirula and Chumateleti is serving about 29,000 people<sup>8</sup> living in 13 communities of the Kharagauli District in central Georgia – approximately 150 km west of the capital Tbilisi. The road has deteriorated considerably during last 10 years and has very low traffic volumes in some sections east of Kharagauli. Many sections of it are now irreparable and impassable during rain and snow.
- The road can no longer fully and efficiently function either as a local road or a strategic alternative route for through traffic. Due to the poor condition of the project road, the residents of Kharagauli must walk long distances to use the railway, their only form of regular transport during winter.
- About 30% of the municipality's population is unemployed. More than a third of the population believe that road infrastructure rehabilitation is the most pressing need of the municipality.<sup>9</sup>
- In the locality, there is no appropriate alternative for the local inhabitants and enterprises for their daily transportation needs. The Khashuri-Kharagauli-

<sup>7</sup> Georgia Transport Sector Assessment, Strategy, and Road Map. ADB, 2014.

<sup>8</sup> [http://www.imereti.ge/index.php?lang\\_id=GEO&sec\\_id=88](http://www.imereti.ge/index.php?lang_id=GEO&sec_id=88), Retrieved on 17 June, 2014.

<sup>9</sup> Kharagauli Municipal Economic Development Plan. A report prepared under the Georgia Employment and Infrastructure Initiative financed by the United States Agency for International Development. September 2007.

Zestafoni railway is located in the same corridor with the project road between Km 0 and Km 38. The project will promote road-rail integration and will increase local passengers' comfort and convenience by improving bus shelters and access to the project road at local railway stations. However, according to the information obtained from the Georgian Railways, the on-going modernization of the railway line is aimed primarily at the improving conditions of the long-distance freight transport; no major upgrading of the passenger facilities will be included in the railway modernization project. Therefore, improved rail link will not provide an alternative, which would affect the modal distribution between road and rail transportation significantly.

- With the road, given the mountainous terrain and the location of the Borjomi-Kharagauli National Park on the southern side of the project road, the present corridor is the only reasonable route from the villages and municipalities to the highway network and larger cities.
- The road will improve the mobility of the municipality's population. This will encourage subsistence farmers to increase production because of faster and better access and connectivity to neighbouring towns. Improved bus shelters and access provided by the project road at local railway stations will increase local passengers' comfort and convenience, and promote road-rail integration.
- On the commercial investment aspect, investors will be inclined to develop the area's natural spring water supply. Also a hot sulphur spring resort located about 5 km south of the project road in Nunisi can become a major attraction and with improved access will boost employment to more people. Other investors will be enthused to invest and revitalize the local tourism economy activities. Local tourism can benefit from more visitors using the project road than the slower southern entrance to the Borjomi-Kharagauli National Park.
- Better road can increase economic activity in the Kharagauli municipality and will have more vibrant commercial activity as a result of more traffic through the road. The rest of the areas will develop and new economic activities can mushroom leading to increase in family income and better standard of living.
- Due to new businesses that will be created, employment will be generated and lessen the out-migration from the villages. Agriculture will improve since produce can easily be transported to the markets and the local economy will experience growth.
- With increase income, extraction of forest resources will be lessened and will result in better preservation of the surrounding forest areas and national park. In addition, enforcement of forest protection laws can be enhanced with ease of patrolling along the new road.

### **3. Alternatives Considered**

#### **3.1 The "No-Project" Alternative**

267. Within the framework of ADB's SPS 2009, an important consideration on "No Project" alternative is being devoted on. The "No-Project" alternative presents case scenario in which the project is not to be done at all. By comparative evaluation, it can be inferred whether the project is necessary at all or provide some insights on how to properly proceed should the project be fully implemented.

268. The "No-Project" alternative scenario will mean that the road stays "as is", in which no

rehabilitation works. Based on this the following desirable and undesirable scenarios can be expected:

- The current road will remain difficult to traverse and can become impassable during winter months.
- Since, people in the surrounding area will have only the railway as the convenient mode of travel, local mobility will continue to be hampered. With this the local village will remain difficult to access leading to a stagnant local economy.
- By not rehabilitating the road, the people will continue to have difficult access and along with it also difficult access to social services such as health, education, etc.
- If the bad road condition continues, tourism will also remain dormant as people will be discouraged to visit areas due to difficulty in reaching places of interest. Investment in terms of tourist accommodations will be limited; and subsequently, with limited marketability of the tourism sector, other economic activities will be hampered.
- One premium that can be mentioned if the road remains as it is now, is that the forest areas and natural parks will have less disturbance and anthropogenic impacts due to less people coming in the area and as a result, nature can be preserved. However, this is not consistent with the BKNP's vision which includes "The protected area has enhanced the economic environment in the planning region and has contributed to rising living standards through an innovative job creation program based on sustainable land use development and environmentally friendly industry. The tourism sector has been well established, centered on the numerous natural and cultural/historic attractions in the region." Hence, the full potential of the BKNP will not be tapped for the country's economic progress parallel with conservation of biodiversity.
- If no rehabilitation will occur, practically no emission will be generated in the area. It is understandable that one of the undesirable effects during operations would be the increase in vehicular emissions and can degrade the air quality along the vicinity of the road. It is hoped that emission levels will be kept to acceptable levels through regulatory enforcement by corresponding authorities. Trees are carbon sinks and will be a good means of counteracting emissions from vehicle exhaust.
- If no rehabilitation will occur, practically the noise level will remain low as it is now. Noise from vehicle will also increase the average noise levels of the locality and can become a nuisance to the local folks who had been used to quiet surroundings. Noise levels can be suppressed through enforcement of regulatory measures for vehicles to reduce noise.
- If no rehabilitation will occur, the level of vehicular accidents will remain low. Community safety concerns become significant due to occurrence of accidents as more and more vehicles will use the road. This issue, however, will be initially dealt with by producing proper design. In addition, during the operations of the road, safety measures should also be maintained and even upgraded to improve the safety features of the road.

269. Considering the above items and in comparison with those presented in the section "Country and Regional Strategy" and "Locality Specific Rationale", the benefits of rehabilitating and reconstructing the road generally outweigh the expectations of the "No-Project" alternative.

### 3.2 Design Options and Preferred Alternative

270. As mentioned in the Interim report for the PPTA project<sup>10</sup>, the aim of the preliminary design is to provide sufficient information for the road improvements to be selected. Minor adjustments to the selected road improvement(s) may still be necessary during detailed design, but the number of iterations needed to establish the best alignment and confirm the choice of the improvements should decrease significantly.

271. For the road project, the TA Team adopted the design philosophy which would build a cost-effective road to achieve a good, safe and efficient road transport. Innovation, creativity and flexibility are necessary to achieve these challenges. Accordingly, the goal would be to get the best value for the least cost without compromising road safety.

272. As a matter of procedure, initial project screening required a basic cost-effectiveness calculation to ensure that the most efficient option would be selected for detailed appraisal. Subsequently, the study considered three (3) slightly different alignments options based on how strictly the design standard was followed. The project road is located in the river valley at the mountainous region and at the same corridor with railway and river. Given the project road's present location in the river valley at the mountainous region and at the same corridor with railway and river as well as low traffic volumes, options where road would be relocated into new alignments were not realistic in terms of economic or environmental feasibility.

273. The summarized descriptions of the options are as follows:

- Without project Alternative: no improvement of the project road.
- With project, Option No. 1: Design following strictly the standard of this category road.
- With project, Option No. 2: Design following the standard wherever possible, but departing from standard to avoid costly construction solutions and extensive resettlement. Absolute minimum values at these locations are: design speed 20 km/h, curvature radius 20 m, pavement width 6.0 m.
- With project, Option No. 3: Following the existing alignment, re-designing only the most critical section resulting in longer sections with sub-standard design.

274. The best alternative was chosen based on the following conditions and constraints:

- The objective is to find the most cost-effective improvement to the road.
- Social and environmental safeguards were to be ensured.
- The role of the project road as a strategic alternative for the E60 highway and the railway was taken into account.
- The design standards were followed as much as possible and at every location two trucks must be able to pass even if sub-standard solutions were used.

275. The evaluation was done by determining by performing a Least Cost Analysis on the Options 1, 2 & 3, excluding environmental and resettlement cost, which can be treated as similar cost to all options. The comparative cost estimates and Least-Cost Analysis is shown below.

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<sup>10</sup> Kocks Consult GmbH, October 2014. Interim Report: TA-8411 GEO: Secondary Road Improvement Project – Feasibility Study and Preliminary Design (46375-001) for “Dzirula-Kharagauli-Moliti-Pona-Chumateleti” Km 0.0 – Km 50.0 Road Section.

**Table 40: Results of Least-Cost Analysis**

Option	Distance (km)	Present Value of Capital Costs (\$ million)	Cost/km (\$ million)
1	49.440	101.0	2.0
2	50.405	66.6	1.3
3	50.477	55.0	1.1

Source: The Consultant.

276. The Table above shows that Option 3 was approximately 15% cheaper than Option 2 with marginally smaller social and environmental negative impacts. The Option 3 was, however, prepared as a minimum option for comparing purposes with several sub-standard solutions. Comparing the technical conditions provided for each option, Option 3 was not acceptable due to narrow road width at some locations where the road corridor space was limited. Based on this discussion and the mutual site visit of the Road Department and the Consultant, **Option 2 (the Preferred Alternative)** was the alternative selected for detailed appraisal and further design.

277. For the rehabilitation options, pavement alternatives (asphalt concrete and cement concrete) were also conceptualized. These were all part of technical studies which were presented in the feasibility study report as preliminary design. Suffice it to say that the foregoing exercises were done in the course of the technical study and environmental and social implications were assessed to minimized impacts in arriving at the Preferred Option.

278. In terms of procurement of works, the Design-Bid-Build Option is being recommended over the Design-Build Option to ensure that Environmental and Social Safeguards requirements will be fully adhered to during the implementation of the project.

## **H. Consultation, Participation and Information Disclosure**

### **1. Public Consultations and Participation**

279. The project had a number of public consultation meetings with the local population in the project road area. The first two were mainly done to introduce the project and discuss the importance of the road to the local, regional and country setting. The next three public consultations were specifically for environmental aspects of the road construction. The social sector also had public consultations focusing on the land property compensation aspect.

#### **1.1 Initial Public Consultations**

280. The first meeting with the local people was held in Kharagauli in May 2014 while the second meeting took place in Moliti in August 2014. In both of these events, the Consultant gave presentations about the project road and answered the questions raised by the audience. These two meetings introduced the project to the local residents and served initial public consultations.

281. The first meeting considered also as public consultation was held at the administration building in Kharagauli on 21 May 2014. The event was initiated by Member of Parliament, Mr. Nodar Ebanoidze, who also attended the said meeting along with twenty-five (25) other participants representing the officials and residents of the Kharagauli town and villages along the project road. The meeting was announced and reported in local newspapers and internet news sites.

282. In this meeting, the Consultant gave a presentation of the project road and answered the questions raised by the audience. The officials and residents emphasized strongly the importance of the road rehabilitation project, since the present condition of the road is seriously hampering their day-to-day life. According to the residents of the villages, the road has been for long periods practically impassable for the ordinary passenger cars, and partly for this reason many families and individuals have moved out of these villages for better transport access. In this meeting, the attendees mentioned a few proposals for the realignment of the road and new bridges for the Consultant to consider.

283. The second public consultation/meeting for the project was held in Moliti School building on 20 August 2014 with forty-eight (48) people in attendance. Similar to the first one, the objective of the public consultation/meeting was to introduce the project to the public and provide the possibility for the residents of the project area to give comments and suggestions. In this meeting, Mr. Nodar Ebanoidze, Member of Parliament, delivered introductory speech on the project background and necessity of development of the project. This was followed by technical presentation by the Consultant explaining the objectives and main outcomes of the project. Subsequently, Mr. Vazha Panchulidze, the Chairman of the Roads Department of Georgia, highlighted the importance of the project for the Road Department and explained the significance of the project road in the context of the Georgian road network, in particular as alternative route for the East-West highway.

284. Also in this meeting, a presentation was done by Mr. Akaki Saghirashvili, Deputy Infrastructure Director of Georgian Railway consisting of a short overview of the railway project - the Khashuri – Kharagauli – Zestafoni Railway Line Modernization Project. The project road has several points of intersection with the project road, a good chance for joint coordination.

285. In this meeting, the concerns raised were as follows:

- In the village Saghandzile, a school is directly located at the project road and safety measures for the school pupils needs to be considered
- At km 16 from Dzirula, improvements of the sharp curve should avoid private properties
- The residents emphasized the importance of the road rehabilitation, since the present condition of the road makes the road impassable for ordinary passenger cars. Concerns were raised that the project might not be implemented, as improvements were several times already promised, but so far were not implemented.

286. The suggestions regarding technical matters were noted and would be considered during preparation of the design. Mr. Vazha Panchulidze and Mr. Giorgi Kiziria from ADB Georgia Resident Mission, underscored the importance of the road and assured that rehabilitation has high priority. Questions regarding the ongoing railway construction were answered by Akaki Saghirashvili.

## **1.2 Public Consultations on the Environmental Aspects**

287. In accordance with ADB's Public Communications Policy (2005) and SPS (2009), Public Consultation meetings on the environmental aspects were undertaken on 15 November 2014 in three locations along the project road. These were organized by the Roads Department through official communication to the local leaders inviting stakeholders in the surrounding villages. An official request by the Consultant was issued to the Roads Department with the following particulars:

### **A. Location: Kharagauli Municipal Hall, Date: 15 November, Time: 9:30-10:30 AM**

- Local residents from the following villages: Kharagauli, Kveda Ilemi, Zeda Ilemi, Leladiziseuli, Gverki, Lashe, Kickhis Igoreti, Saqari Qedi, Tetratshkaro, Akhalsofeli, Islari, Japarauli, Chkheri, Bazaleti, Qrili, Tsipi, Ghari, Khevi, Sabe, Tsitelkhevi, Zarani, Ghudumoqedi, Saghandzile, Vani, Khandebi.
- Kharagauli district's infrastructure and utility representatives (electricity, gas, water, telephone, radio and communication lines, etc.)
- Executive Power representative and Administration Deputy
- Local NGO's
- Interest Groups (Business executives, Establishment operators, etc.)
- Concerned Road Maintenance Division of the region

### **B. Location: Moliti School, Date: 15 November, Time: 1:30-2:30 PM**

- Local residents from the following villages: Moliti, Chrdili, Zvare, Didvake, Patara Sakhvlari, Marelisi, Leqvani, Vakhaniatskali, Zedubani, Qhvebi, Babi, Nebodzeri, Deisi, Serbaisi, Bezhatubani, Nunisi
- Moliti district's infrastructure and utility representatives (electricity, gas, water, telephone, radio and communication lines, etc.)
- Executive Power representative and Administration Deputy
- Local NGO's
- Interest Groups (Business executives, Establishment operators, etc.)
- Concerned Road Maintenance Division of the region



**C. Location: Chumateleti, Date: 15 November, Time:4:00-5:00 PM**

- Local residents from the following villages: Chumateleti, Pona, Tsipa, Golatubani, Gvirabi.
- Chumateleti district's infrastructure and utility representatives (electricity, gas, water, telephone, radio and communication lines, etc.)
- Executive Power representative and Administration Deputy
- Local NGO's
- Interest Groups (Business executives, Establishment operators, etc.)
- Concerned Road Maintenance Division of the region

288. During the said public consultation the Consultant (Kocks Consult, GmbH), prepared PowerPoint presentation regarding the technical features of the project and explained the potential environmental and social impacts with corresponding mitigation measures. This event was also attended by Roads Department representative<sup>11</sup>, who clarified issues and responded to questions raised by the attendees. Technical issues related to the project were responded by the Consultant representative<sup>12</sup>. Huge attendance of around two-hundred (200) people<sup>13</sup> showed up in Kharagauli; in Moliti, around twenty-one (21) people attended; while in Chumateleti around nine (9) people were there. The listed people who attended are shown in Annex 1-A.

289. After the PowerPoint presentation, an open forum and question and answer portion followed. At this instance, the participants were able to express what they thought about the project and were given a chance to ask clarificatory questions. At the same time, sheets of paper were distributed for those who would prefer to write their questions or comments rather than openly raise them during the forum. Below also are photos of the public consultation. Over all, the project has positive support from the attendees of the public consultation and they expressed appreciation on the initiation of the road project.

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<sup>11</sup> Ms. Luisa Bubashvili, Roads Department representative was in the 15 Nov. 2014 public consultations.

<sup>12</sup> Mr. Samuel E. Sapuay, International Environmental and Social Specialist, Kocks Consult GmbH.

<sup>13</sup> Due to the huge number of people, not all were able to register during the time of the presentation.



**Figure 13: Public Consultation in Kharagauli**



**Figure 14: Public Consultation in Moliti**



**Figure 15: Public Consultation in Chumateleti**

### **1.3 Comments Received & Responses**

290. The questions raised verbally during the forum were responded right away, while those written will be responded to by the Roads Department. In addition, the people who attended were provided with a sheet of paper on which to write their questions and comments on the project. The recorded questions and corresponding responses by the Roads Department are shown in Annex 1-B. The verbal and written comments and questions that were raised were compiled and present as follows:

#### **Comments:**

- There is another road on the left side of the river and if is possible, to use that one as bypass road.
- Tree Cutting will worsen due to the improvement of the road and access.
- Water reservoirs are located nearby the villages and the villages are supplied from them, that's why they shouldn't be destroyed
- The location of underground communications should be ascertained so they will not be affected.
- This is the most important project
- Project is very important and it's good that public involvement is ensured.
- This is very important project for Kharagauli region and its population
- Have no questions regarding the project
- Rehabilitation of the road is of vital interests
- Requirements of EIA should be followed.
- It's very necessary and important project
- Local employment as much as possible.

- I think rehabilitation of the road has vital importance and it will stop out-migration process.
- This is the best project; if it will be implemented by following of requirements, it will affect less the population and will not create ecological problems.
- Project is very important.
- During construction you will be needed in storing area for some facilities. There is former wine plant building with sufficient and appropriate area. In case of need we can rent it, please consider to contact us.
- The project is very important and the population has great expectations about it.
- This is very important project for Kharagauli region. Thank you very much for providing detailed information.
- I'm very happy that project will be implemented.
- Have no questions.
- This is very nice project. Welcome!
- It's very important for local population's employment.
- This is important project, but should be protected from risk factors.
- This is very important project for region's population and thanks to everybody who is involved in it.

#### **Questions:**

- Will the road be constructed in the town territory or on the right side of Chkherimela River?
- Is it possible not to be used Kharagauli central road as a highway road section?
- If ADB is planning to review/study Ghoresha-Ubisa road rehabilitation issue?
- When will be the Kharagauli-Ubisa road rehabilitation?
- Will local population be employed during construction?
- If rehabilitated road will go through town territory, which measures will be considered for transport development?
- Does the project consider rehabilitation of Khargveshi-Ghoresha-Ubisa road and if it is possible to discuss it as an alternative road? This one will be very important for our municipality.
- Why is ADB interested in implementation of this project? Will the project road affect municipality's population?
- How many families it will be affected? Is there a plan for Ghoresha-Ubisa road construction? Does it consider dams/ retaining structure for snow anti-avalanche?
- What about local population employment?
- Is there a plan for construction of underground communications?
- Will local population be employed during road construction?

291. Generally, the comments were positive, thus welcoming the project in the area. There was a concern of increase tree-cutting activities, however, due to the road the enforcement against it can also improve. It is hoped that better income opportunities will improve the economy and lessen the need to cut trees. The questions on the other hand were on impacts to population, employment of local population, and also touched on the need for some other roads to be improved. These questions were brought to the attention of the Roads Department for their corresponding responses.

292. Several of the comments were already incorporated in this IEE such as concerns of employment for local people, damage to infrastructure and protection of some trees. In response to employment concerns, preference to local resident in terms of hiring labour for the project was emphasize. On the impact to infrastructure, provisions in the EMP were included to undertake good planning to enable infrastructure service not to be disrupted. On impacts to trees, provision for replacement on a ratio of 1:2 was included in the EMP and impact trees would be avoided in all the facilities of the Contractor as much as possible.

## **2. Information Disclosure**

293. Once the IEE is approved by the Ministry of Environmental and Natural Resources Protection (MoENRP) and cleared by ADB, this document will be made available as information to the public, both in English and in Georgian languages. The Georgian Version of the IEE will be available in the Roads Department office and copies shall be made available to the people through the municipal office in Kharagauli. The IEE shall also be disclosed to a wider audience via the ADB website. During the project implementation, periodic environmental monitoring reports shall be submitted by Implementing/Executing Agencies and correspondingly also be uploaded in the ADB website.

294. Should additional information be required at any time about the project, the public may visit the Roads Department or interact with the future construction supervision consultant who will be selected for the project. On-site consultations will be held for clarifications and provision of necessary information to the public and the stakeholders on as need basis.

### **I. Grievance Redress Mechanism**

295. The project road shall mainly be done along the existing alignment where residences and farmlands are existing along it. As most of the impacts are construction-related, and therefore it is anticipated that improper or inadequate implementation of Environmental Management Plan may lead, at worst, to dispute and conflicts; or at best only to disturbance and inconvenience to local people. In order to provide a direct channel to the affected persons for approaching project authorities and have their grievance recorded and redressed in an appropriate time frame, a Grievance Redress Mechanism shall be established, which will be operational throughout the construction period. The GRM shall be consistent with ADB's Accountability Mechanism Policy 2003 characterized as transparent, participatory, credible, and effective. In the implementation of this policy, both the consultation and compliance review phases have been useful and delivered effective outcomes.

296. During construction period, a complaint register will be made available at the site office of the Contractor, with a display board indicating availability of such mechanism. This will accept complaints regarding the environment safeguard issues in implementation of the project. The grievances received and actions taken will be included into the environmental monitoring reports submitted to ADB. The process for the grievance redress will be as follows:

- Complaints received (written or oral communication) will be registered in Complaint Register assigning complaint number with date of receipt.
- Supervision Consultant (SC) will review the complaint and direct the Contractor for necessary action.
- In case of no satisfactory action, the complainant can approach the nearest local court in District or Region (in Zestafoni or Khashuri) that has jurisdiction on the locality where the issue has occurred.

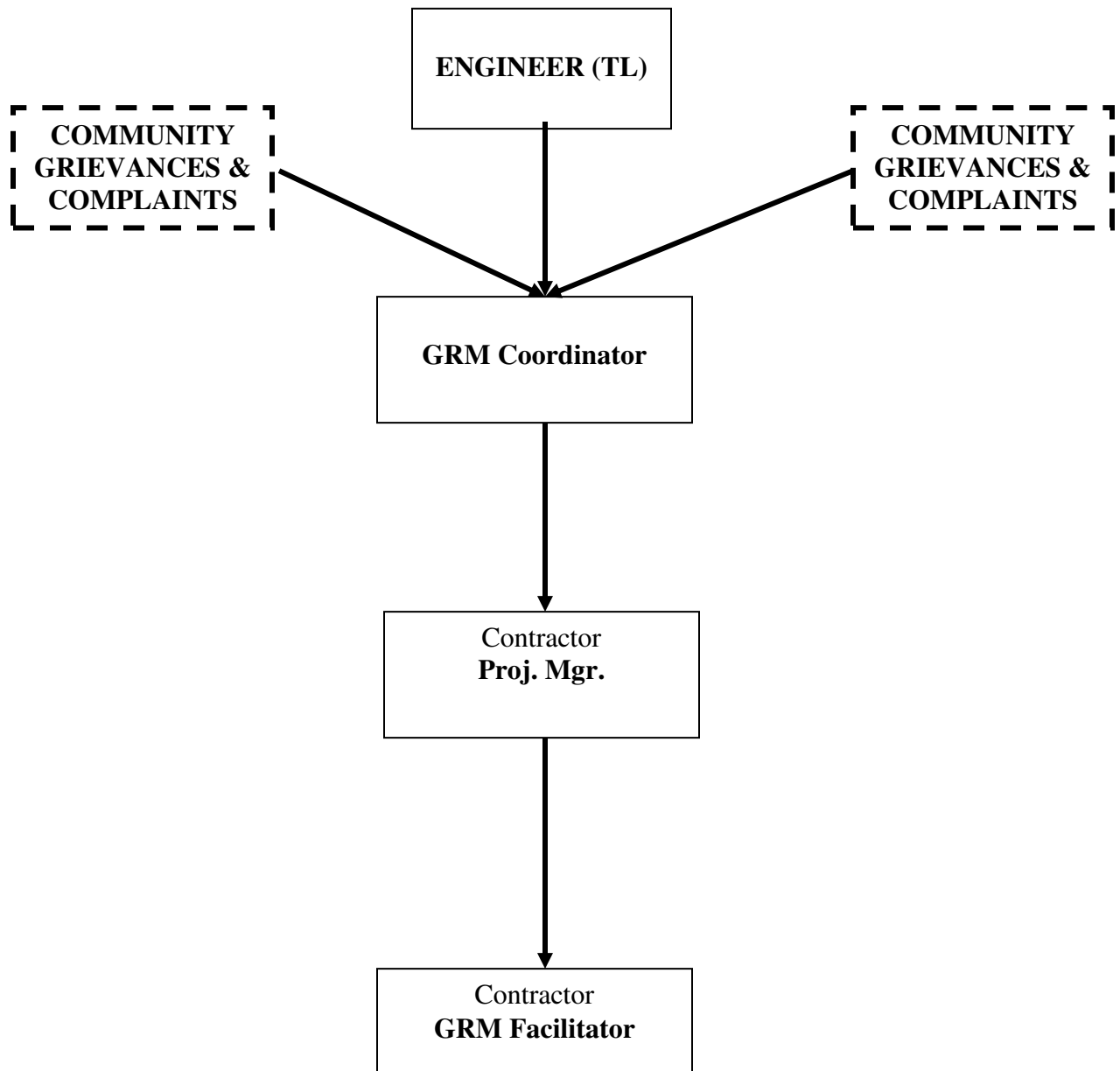
## 1. Administrative Structure and Key Functionaries

297. The Grievance Redress Mechanism in the Project site will be a means in order for the Roads Department to be aware of and respond to stakeholders' concerns related to the project in a timely manner. The GRM process or procedure will be established to receive and facilitate resolution of stakeholders' concerns and grievances pertaining to the Contractor's environmental and social performance. Based on the guidelines of a number of funding institutions including ADB, the GRM will be designed to meet the needs of the project as well as conform to existing local guidelines. The composition of the GRM structure shall consist of the following:

- **Engineer-Team Leader** – as the Client Representative, will oversee the resolution process of the GRM and ensures that the coordination procedures are working at optimum level. He shall have the overall responsibility over the resolution process of the GRM.
- **GRM Coordinator – Engineer's Staff** – will be the chief implementer of the GRM and will initiate coordination with the other designated contact GRM members of the Contractor and those in the community. In addition, the GRM Coordinator shall have the following functions, tasks and responsibilities:
  - Ensure that all complaints or grievance are registered.
  - Analyze the complaint or grievance with the Engineer's staff and come up with initial assessment with recommended action to the Team Leader.
  - Spearheads the gathering of accurate information regarding the complaint which includes documentary and site verification, as well as cross-examination with primary (from survey) and secondary information.
  - Update and advice the complainant on the progress of the complaints for appropriate follow-up actions.
  - Recommends the appropriate approach and strategy for the resolution of issues.
  - Coordinates with Contractor's GRM Facilitators on the appropriate action needed for the resolution of issues.
  - Documents the progress of the complaints until final acceptance of the solution or measures by the complainant
  - In case of non-resolution of issue, conduct an in-depth review process and formulate alternative approach and strategy
  - Coordinates communication with outside local, regional offices and/or and entities that has jurisdictional responsibility over the issue or area and conduct follow-through tasks on the progress of the complaints.
- **Contractor – Project Manager** – as the Contractor's Representative shall ensure that the agreed measures appropriate to the complaints be performed in the most practical and expedient manner.
- **GRM Facilitator – Contractor's Staff** – actively coordinates and follows through the Contractor's performance of the measures and reports the progress of such measures to the GRM Coordinator. Assists the GRM Coordinator in gathering accurate information relevant to the complaint.

298. The coordination arrangement chart is shown below

**Figure 16: GRM Coordination Arrangement in the Project Site**



Source: The Consultant

## 2. Dispute Resolution Process

299. During the actual operationalization of the Grievance Redress Mechanism, the process and communication flows will be centered with GRM Coordinator. The GRM Coordinator will take initiative to be observant of any issue and will try to obtain information which will be used at the subsequent GRM process stages. These information can become valuable inputs to resolution of issues and to avoid any conflicts that can further complicate situations.

300. In a normal processing of GRM the complaints undergoes four (4) major procedural stages with intervening activities as follows:

**Stage I: REGISTRATION AND INITIAL ASSESSMENT:** This is the entry point of complaint wherein the complainant is allowed to tell his side of the issue and to be assured that his grievance will be seriously and expeditiously dealt with. The following are the tasks in this stage.

- **Receive Grievance** – This task will entail listening intently from the source of the complaint, filling out the **Complaint Form** (sample in Annex 2) and registering in a **GRM Registry Book** (sample in Annex 3) and assigning a **GRM Reference Number**. The complainant or representative shall affix a signature and provide contact particulars on the Complaint Form. Important information shall be entered in the Complaint Form which can be supplemented by additional documents.
- **Obtain Comprehensive Information** – At this task the GRM Coordinator will mobilize some staff from the Engineer's organization or ask assistance from the Contractor's GRM Facilitator to obtain as much information as possible from the location where the complaint originated, the impact area and the outlying areas. Field information will be gathered using necessary survey methodologies, equipment and devices. Interviews shall be conducted directly from the field to have the actual appreciation of the nature of the complaint and to obtain other versions of the issue. It would be necessary to talk and discuss with as much people as possible who have direct and indirect knowledge on the problem. Photographs and videos shall be obtained which can be used later in the analysis of the problem. Secondary backup information shall also be acquired to determine some background information and cross-reference them with other sources of information.
- **Screen and Assess** – After gathering all the available and obtainable information, the GRM Coordinator with the support of the Engineer's staff shall analyze the complaint and verify what can be admissible information. The team will render opinion whether the complaint is project related or not and provide justifications for such opinion. The findings shall be communicated for the complainant upon which in case of disagreement, supplementary information may have to be provided by the complainant.

**Stage II: INITIAL RESOLUTION:** Based on the opinions of the screening and upon presentation of additional documentary evidences by the complainant, the Engineer will instruct the GRM Coordinator to direct the complaint to one of the following options:

- **Refer to Appropriate Venue/s** – If the issue is not relevant to the project, the GRM Coordinator will refer the issue to appropriate competent office and explain to the complainant the reasons. He will advise the complainant on what to do and provide contact particulars to that appropriate office if available. Primarily, these can be the environmental agency (MoENRP), local authorities or the local courts court in District or Region (in



Zestafoni or Khashuri) that has jurisdiction on the issues that may arise. Also if available and possible he can refer the complainant to some people who can really be of good help (e.g. NGO's). After this steps, the matter will be considered closed and Resolution Acceptance Form will be issued for the acceptance and signature of the complainant. Relevant information regarding the resolved complaint shall be gathered and a cross entry shall be entered in the GRM Registry Book.

- **Resolve within the Project** – If found to be project related, the Engineer will give a directive to the Contractor/s to resolve the matter. It would be necessary to have a meeting with the Contractor/s' project manager regarding the issue. The meeting will entail determination of the most preferred options, which will be part of the next stage (Stage III) of GRM process.
- **Reject the Complaint with Clear Explanation** – When in the opinion of the Engineer and the GRM Coordinator that the complaint is not project-related, it is rejected and such decision will be communicated to the complainant. After which the matter will be considered closed and all relevant information shall form part of the archived information.

**Stage III: SELECTION OF APPROACH AND STRATEGY:** At this stage the Engineer and the Contractor/s will agree to accept the complaint and to locally resolve it; and henceforth shall decide on the proper approach and strategy for its resolutions. Depending on the gravity of the situation and of the complaint the GRM has the following options:

- **Engineer/ Contractor/s Recommend Solution** – In this approach, as in most cases, the Engineer and the Contractor shall decide on the technical solution to the issue and implement the measure/s. This seems straightforward especially if this is within the scope and obligations of the Contract. Some contractual issues may arise pertaining to the cost and payment considerations but this can be decided by the Contractor and the Engineer. After due decision is made on the division of scope and responsibility, the GRM Coordinator will oversee the implementation of the resolution or measures and report to the Engineer. The progress of the execution of works is documented with periodic coordinative reporting to the Engineer. The complainant is also appraised on the progress of the work for better attainment of results for improved effectiveness of the measures
- **Complainant Joint Solution** – In some cases, the cooperation and collaborative effort of the complainant is necessary since he/she may be able to provide some avenues to facilitate the devising of the schemed solution. In some instances, economy can be affected and with greater satisfaction to the complainant if his opinion is sought. Although the ultimate decision will be with the Engineer, it will be a good option if the complainant is brought into the problem solving process.
- **Third Party Arbitration** – In complicated matters where the complainant does not agree that working with the Engineer and Contractor will not be perceived as balanced and fair, the complaint can be elevated for arbitration. This may not be an easy approach as the project will have to organize and set up an arbitrating party, perceived as impartial, to execute the process. Nevertheless, this can still be pursued if both the Engineer-Contractor and the complainant agree to use this approach.
- **Local Conflict Resolution** – The Regions, particularly in Imereti and Sidha Kartli, have a number of ways where local conflict resolutions venues exist. These are through the local courts, council of elders in the village, through the appointed head of local municipality. In these venues, the issues are discussed and with the participation of the Engineer, consensus can be arrived at for the benefit of those affected directly and indirectly by the issue.

**Stage IV: EXECUTION OF MEASURES AND DOCUMENTATION:** At this stage, the agreed solution or measures are implemented by the Contractor under the supervision of the Engineer and tracked down by the GRM Coordinator for documentary purposes.

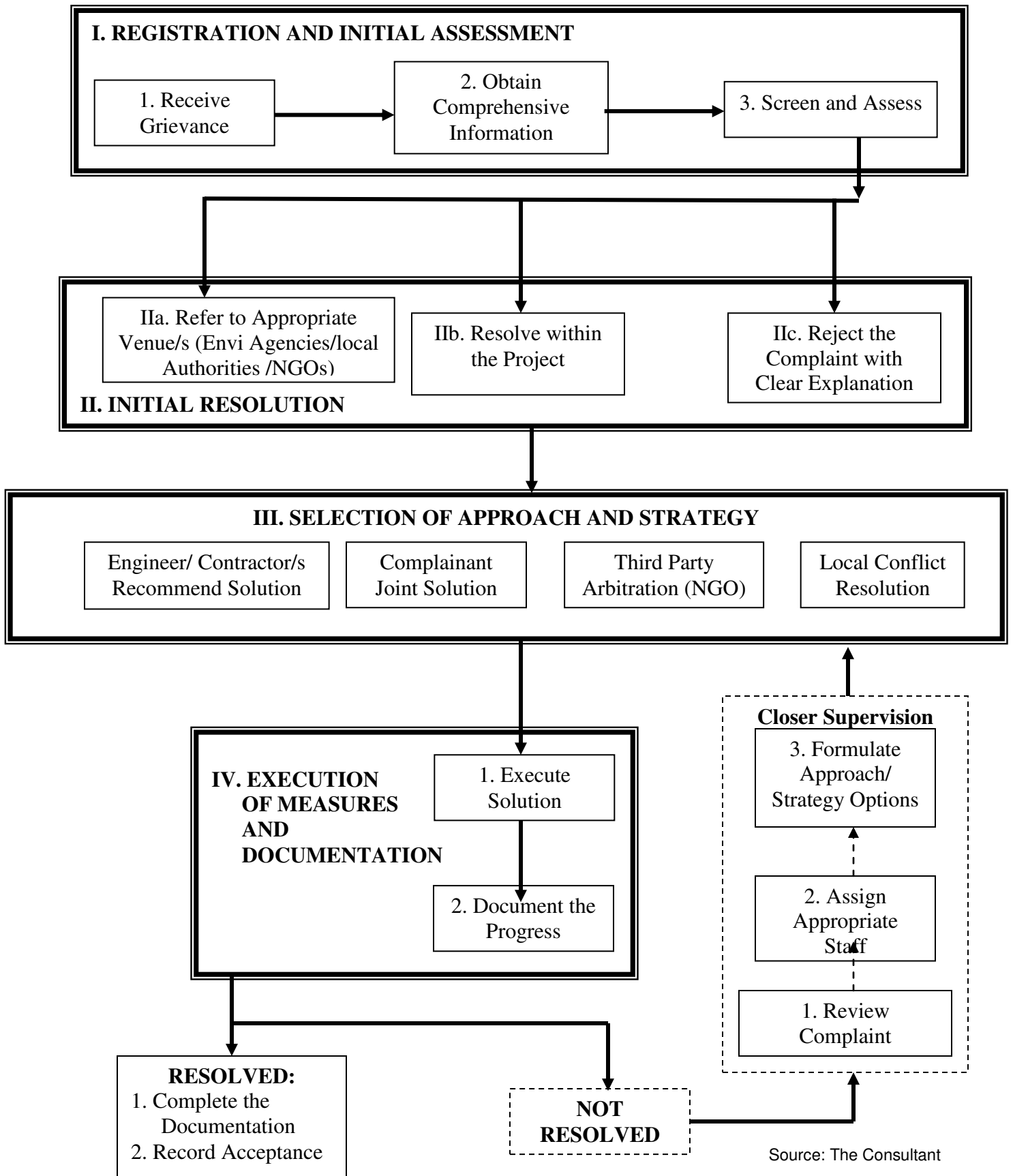
- **Execute Solution** – The execution of solution will entail engagement of the Contractor and his staff. Designs or schemes will be agreed upon and to be checked by the staff of the Engineer as part of their facilitation tasks. Equipment and materials will be employed and work will be performed by the Contractor and supervised by the Engineer's staff.
- **Document the Progress** – The GRM Coordinator will undertake full documentation of the work and shall form part of the **Measures Implementation Form**, and shall also include designs and schemes, costings, photographs of the work (before, during and after) which will form part of the progress reporting and documentation archive of the GRM.

301. Finally, two things can occur at the end – the complainant is satisfied or the complainant is not satisfied; and hence the issue persists. These two pathways are presented here:

- If the issue is deemed satisfactory the grievance is considered **RESOLVED** and hence two more tasks are remaining:
  1. **Complete the Documentation** – The GRM Coordinator will complete all documentations in reference to the **Measures Implementation Form** and ask the complainant to sign the **Resolution Acceptance Form** that he/she was satisfied with the measures implemented.
  2. **Record Acceptance** – In the end, the GRM Coordinator will put an entry in the GRM Registry Book that the grievance is resolved.
- In case the issue is **Not Resolved**, the complaint and grievance will follow another pathway entailing the following sub-tasks and then gets back to Stage III to repeat the process:
  1. **Review Complaint** – The GRM Coordinator will initiate a review and if necessary request the Engineer to convene a group for larger review. The purpose of this is to determine other underlying issues that caused that non-resolution of the complaint.
  2. **Assign Appropriate Staff** – It may be necessary that appropriate staff will have to assist in the process or even outside assistance from some governmental offices may be necessary. The GRM Coordinator will seek out other staff who can be contributive to the resolution of the issue
  3. **Formulate Approach/ Strategy Options** – The GRM should also determine if the approach itself was the cause of the non-resolution of the issues. In this instance, he/she will ask the Engineer to revisit the initial approach and further refine it or even change it entirely when necessary.

302. During this internal sub-process, the GRM Coordinator should be proactive in documenting every step which will form part of the documentary work and progress monitoring of the GRM process. The entire GRM Process Flowchart is summarized in a diagram below.

**Figure 17: Grievance Redress Mechanism (GRM) Process Flowchart**



## **J. Environmental Management Plan**

### **1. Formulation of the Management and Monitoring Plan**

303. The **Environmental Management Plan (EMP)** for the project road, consisting of impact mitigation and monitoring plan, are prepared as part of this IEE. The EMP is designed in accordance with the requirements stated in ADB-SPS 2009, moreover adapted to the specific requirements of the project road. Based on preliminary designs and construction scope methodologies the impacts to the physical and social environment were developed along with the corresponding mitigation measures.

304. To be more effective during implementation the EMP will be attached to the tender documents (Particular Conditions of Contract of the FIDIC format). As part of the environmental management, the procedures for: workers' health and safety; public safety and reduce inconvenience and disposal of construction wastes, etc., are also included.

305. A program of monitoring, the **Environmental Monitoring Plan (EMoP)**, is also developed herein to ensure that all concerned agencies take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be necessary. Regular inspection of implemented measures by Civil Works Contractors will be conducted by the Construction Supervision Consultant, and overseen by the Roads Department, as the Implementing Agency (IA). Monitoring during operation stage will later on be conducted by Roads Department.

306. During construction phase, most of the mitigation measures are fairly standard methods of minimizing disturbance from on account of the construction activities in populated areas (maintaining access, planning work to minimize public inconvenience and traffic disruptions, finding uses for waste material, etc.). Monitoring of such measures normally involves making observations in the course of site visits, although some require more formal checking of records and other aspects. During the construction, the air quality and noise must remain below specified concentrations and levels. The monitoring of ambient air quality and noise levels during construction is the responsibility of Contractor. The Supervision Consultant will supervise and monitor the contractor's performance during the construction.

307. The first set of Tables following this discussion show Environmental Management Plans respectively for various stages – pre-construction and design, construction and operation. These show mitigation activities, methods, project agencies responsible for implementation and monitoring of mitigation measures. For establishing Baseline Measurements of environmental Parameters, a Table for it is presented. For the monitoring activities during construction, the Table EMoP: Construction Phase Instrumental Monitoring is presented showing the various monitoring activities to be conducted. It describes: (i) mitigation measures; (ii) location; (iii) measurement method; (iv) frequency of monitoring; and (v) responsibility for monitoring.

308. This EMP/EMoP will be part of the contract documents consisting of specified measures covering most of the possible issues that can occur will enable the avoidance, reduction, and mitigation of adverse impacts in the project cycle. The Contractor shall adopt the measures, particularly those for the construction into the SSEMP consistent with their own work program. Supplementary plans will also be drawn up by the Contractor for specific situations to ensure a focused action on any problem that might arise.

309. Such plans and guidelines must be clearly communicated to everyone involved in the

construction activities from the top of the construction management down to the level of the workers to achieve the objectives of the environmental protection framework and general welfare. Accordingly, such will be expected on the part of the Sub-Contractor. During construction, the Contractor and the Engineer shall inspect the worksites, material sources and campsites of the Sub-Contractor to determine level of compliance with the IEE/EMP. Enforcement of the requirements of the IEE/EMP shall be the responsibility of the Contractor; and thus be answerable to the Contract.

**Environmental Management Plan**  
**Table 41: EMP – Construction Phase Mitigation**

EMP: Construction Phase Mitigation			
Subject	Potential Impact/Issue	Mitigation Measure	Responsibilities
Topography	Cut and Fill Requirement	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> <li>Deposition areas should be ascertained by the Contractor prior to cutting or excavations. Temporary and permanent storage of materials should be confined to government owned land and in no circumstances should be dumped on agricultural or productive lands (without owner's written permission) or to any watercourse including irrigation channels.</li> <li>In the event of any spoil or debris from construction works being deposited in any of the aforementioned areas or any silt washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of the Engineer.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Engineer to routinely monitor Contractors deposition/ dumping activities.</li> <li>Approvals for waste disposal sites to be sought from the Concerned Agencies by the Contractor.</li> </ul>
	Quarries	<p>Suitable Borrow areas have been identified in the Feasibility Study and are described in this IEE. These borrow areas are already in operation. Therefore environmental impacts concerning potential disfigurement of landscape, vegetation losses and damage to access roads are kept to a minimum. Prior to start material extraction the contractor submit his SSEMP through the Construction Supervisor (CS) to the Executing agency of the PIU indicating the location of the proposed extraction site as well as rehabilitation measures and implementation schedule for the borrow areas and access roads. Rehabilitation measures may not be necessary for borrow areas still in operation after road works have finished. The SSEMP needs to address the sensitive issues of avoidance of transportation through residential areas as far as technically feasible and closure rehabilitation.</p> <ul style="list-style-type: none"> <li>For purpose of surface water protection material stockpiles shall be located at least 100 m away from surface waters.</li> <li>For dust suppression unpaved access road shall be watered during critical dry periods within vicinity of settlements.</li> </ul> <p>Should the Contractor decide to establish his own quarry, he will be responsible for the entire facility with respect to all permitting and environmental requirements. Prior to opening of any quarry or rock crushing facility, the Contractor will require approval from the relevant Concerned Agencies and the Engineer to ensure that land owners are adequately compensated for land use and that the sites are not located in an area likely to cause significant detriment to the local environment. To ensure that this is the case Contractors should ensure that quarries and crusher plants are:</p> <ul style="list-style-type: none"> <li>Located at least 300 meters from urban areas to prevent noise and dust impacts;</li> <li>Located outside of agricultural land; and</li> </ul>	<ul style="list-style-type: none"> <li>Concerned Agencies to approve locations.</li> <li>Contractor to obtain necessary permits.</li> <li>Engineer to review permits and approvals prior to the opening of the site.</li> <li>Contractor to submit Quarry Reinstatement Plan to the Contractor; Engineer to review and approve.</li> <li>Engineer to inspect the reinstatement work on the quarry area by the Contractor</li> </ul>

<b>EMP: Construction Phase Mitigation</b>			
<b>Subject</b>	<b>Potential Impact/Issue</b>	<b>Mitigation Measure</b>	<b>Responsibilities</b>
		<ul style="list-style-type: none"> <li>Where possible located on government owned lands.</li> <li>Quarry area should be reinstated prior to the completion of the project.</li> <li>Silt-laden water should be retained in sedimentation ponds to allow silt materials to settle; water-recycling should be considered to minimize turbidity in receiving waters.</li> <li>A Quarry Site Reinstatement plan should be presented by the Contractor to the Engineer. The Quarry Site Reinstatement Plan must be approved by the Engineer with the concurrence of the RD prior to operating quarry sites by the Contractor.</li> </ul>	
	Borrow Pits.	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> <li>Borrow Pit restoration according to the SSEM will follow the completion of works</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Engineer to routinely monitor Contractors activities.</li> <li>Contractor to submit Quarry Reinstatement Plan to the Contractor; Engineer to review and approve.</li> <li>Engineer to inspect the reinstatement work on the borrow pit by the Contractor</li> </ul>
	Use of other materials	Alluvial material which will be excavated upstream from blocked culvert areas may be used as base material. This material shall be tested by the Contractor and Engineer for its suitability as base material before it may be used. The Contractor must use such material first before using any other quarry or borrow pit within 3 km from any such alluvial deposit.	<ul style="list-style-type: none"> <li>Engineer to test material before use as base material.</li> </ul>
<b>Soil and Ground water Quality</b>	Contamination due to Spills or Hazardous Materials	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> <li>All fuel and chemical storage (if any) shall be sited on an impervious base within bund and secured by fencing. The storage area shall be located away from any watercourse or wetlands. The base and bund walls shall be impermeable and of sufficient capacity to contain 110 percent of the volume of tanks.</li> <li>The construction camp maintenance yard shall be constructed on impervious Layer with adequate drainage to collect spills; there shall be no vehicle maintenance activities on open ground.</li> <li>Filling and refueling shall be strictly controlled and subject to formal procedures. Drip pans shall be placed under all filling and fueling areas. Waste oils shall be stored and disposed of by a licensed contractor.</li> <li>All valves and trigger guns shall be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use.</li> <li>The contents of any tank or drum shall be clearly marked. Measures shall be taken to ensure that no contaminated discharges enter any soils.</li> <li>No bitumen drums or containers, full or used, shall be stored on open ground. They shall only be stored on impervious Layer.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>

EMP: Construction Phase Mitigation			
Subject	Potential Impact/Issue	Mitigation Measure	Responsibilities
		<ul style="list-style-type: none"> <li>Areas using bitumen shall be constructed on impervious Layer to prevent seepage of oils into the soils.</li> </ul>	
Surface Water and Hydrology	Drainage and Flooding	During the construction phase the Contractor is required to construct, maintain, remove and reinstate as necessary temporary drainage works and take all other precautions necessary for the avoidance of damage by flooding and silt washed down from the Works.	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
	Construction Camps and Storage Areas	<p>The Contractor shall ensure the following conditions are met:</p> <ul style="list-style-type: none"> <li>Wastewater arising on the site shall be collected and safely disposed</li> <li>There shall be no direct discharge of sanitary or wash water to surface water. Disposal of materials such as, but not limited to, lubricating oil and onto the ground or water bodies shall be prohibited.</li> <li>Liquid material storage containment areas shall not drain directly to surface water.</li> <li>Lubricating and fuel oil spills shall be cleaned up immediately and spill clean-up shall be materials be maintained at the storage area.</li> <li>Construction and work sites will be equipped with sanitary latrines that do not pollute surface waters.</li> <li>Discharge of sediment-laden construction water directly into surface watercourses will be forbidden. Sediment laden construction water will be discharged into settling lagoons or tanks prior to final discharge.</li> <li>Spill clean-up equipment will be maintained on site. The following conditions to avoid adverse impacts due to improper fuel and chemical storage: <ul style="list-style-type: none"> <li>Fueling operations shall occur only within containment areas.</li> <li>All fuel and chemical storage (if any) shall be sited on an impervious base within bund and secured by fencing. The storage area shall be located away from any watercourse or wetlands. The base and bund walls shall be impermeable and of sufficient capacity to contain 110 percent of the volume of tanks.</li> <li>Filling and refueling shall be strictly controlled and subject to formal procedures and will take place within areas surrounded by bunds to contain spills / leaks of potentially contaminating liquids.</li> <li>All valves and trigger guns shall be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use.</li> <li>The contents of any tank or drum shall be clearly marked. Measures shall be taken to ensure that no contaminated discharges enter any drain or watercourses.</li> <li>Disposal of lubricating oil and other potentially hazardous liquids onto the ground or water bodies will be prohibited.</li> <li>Should any accidental spills occur immediate clean-up will be</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>



EMP: Construction Phase Mitigation			
Subject	Potential Impact/Issue	Mitigation Measure	Responsibilities
		<p>undertaken and all cleanup materials stored in a secure area for disposal to a site authorized for hazardous waste.</p> <ul style="list-style-type: none"> <li>If determined warranted by the Engineer, the Contractor shall provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from the sites. If so requested, the Contractor shall ensure that all vehicle are properly cleaned (bodies and tires are free of sand and mud) prior to leaving the site areas. The Contractor shall provide necessary cleaning facilities on site and ensure that no water or debris from such cleaning operations is deposited off-site.</li> </ul>	
	Bridge Construction	<p>No pillars are drilled into the river for bridge construction. Bridges will be constructed by slabs only. Therefore generation of turbidity plumes and sedimentation which could impact aquatic organisms can be excluded. No impacts are expected on River ecology.</p> <p>The Contractor shall ensure provision/or performance of the following:</p> <ul style="list-style-type: none"> <li>Contractor should provide additional measures to catch debris from falling into the river;</li> <li>Structural elements should be casted far from the river to prevent concrete mix from getting into the water.</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
<b>Air Quality</b>	Open burning of waste materials	The Contractor shall ensure no burning of debris or other materials will occur on the Site without permission of the Engineer.	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
	Fuel Emissions	Contractor shall ensure that no furnaces, boilers or other similar plant or equipment using any fuel that may produce air pollutants will be installed without prior written consent of the Engineer.	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
	Exhaust emissions from the operation of construction machinery	<p>The Contractor shall ensure construction equipment shall be maintained to a good standard and fitted with pollution control devices. The equipment (including the pollution control devices) will be checked at regular intervals by the Engineer to ensure they are maintained in working order and the inspection result will be recorded by the Contractor &amp; Engineer as part of environmental monitoring. In addition, the Contractor shall:</p> <ul style="list-style-type: none"> <li>Discourage of the idling of engines;</li> <li>Prohibit the use of equipment and machinery that causes excessive pollution (i.e. visible smoke) at project work sites;</li> </ul> <p>Ensure material stockpiles being located in sheltered areas and be covered with tarpaulins or other such suitable covering to prevent material becoming airborne.</p>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
	Fugitive emissions from	Quarries and asphalt plant will be located at sufficient distance to any settlements. Therefore no impacts due to fugitive emissions are expected.	<ul style="list-style-type: none"> <li>Engineer to routinely monitor Contractors activities.</li> </ul>

<b>EMP: Construction Phase Mitigation</b>			
<b>Subject</b>	<b>Potential Impact/Issue</b>	<b>Mitigation Measure</b>	<b>Responsibilities</b>
	quarries and asphalt plants.		
	Dust generated from haul roads, unpaved roads, exposed soils and material stock piles.	<p>The Contractor shall ensure that the following dust suppression measures shall be instituted:</p> <ul style="list-style-type: none"> <li>• All trucks used for transporting materials to and from the site will be covered with canvas tarpaulins, or other acceptable type cover (which shall be properly secured) to prevent debris and/or materials from falling from or being blown off the vehicle(s);</li> <li>• Areas of reclamation shall be completed, including final compaction, as quickly as possible consistent with good practice to limit the creation of wind-blown dust.</li> <li>• Hard surfaces will be required in areas with regular movements of vehicles; and</li> <li>• Effective use of water sprays will be implemented (e.g., all unpaved roads within the construction areas of the Site shall be sprayed during critical dry periods at least twice each day, and more if necessary to control dust to the satisfaction of the Engineer).</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor to implement mitigation</li> <li>• Engineer to routinely monitor Contractors activities.</li> </ul>
<b>Noise Generation</b>	Construction Noise and Vibration	<p>The Contractor shall ensure provision of the following:</p> <ul style="list-style-type: none"> <li>• Source Controls, i.e., requirements that all exhaust systems will be maintained in good working order; properly designed engine enclosures and intake silencers will be employed; and regular equipment maintenance will be undertaken;</li> <li>• Site Controls, i.e., requirements that stationary equipment will be placed as far from sensitive land uses as practical; selected to minimize objectionable noise impacts; and provided with shielding mechanisms where possible;</li> <li>• Work near Sensitive Receptors shall be limited to short term activities as far as technically feasible;</li> <li>• Community Awareness, i.e., public notification of construction operations will incorporate noise considerations; methods to handle complaints will be specified. Disposal sites and haul routes will be coordinated with local officials;</li> <li>• Use of low volume charges will reduce the potential for vibration induced damage to structures; and in the event of damage proven to be due to the contractor's activities, owners of structures will be fully compensated.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor to implement mitigation</li> <li>• Engineer to routinely monitor Contractors activities.</li> </ul>
<b>Introduced Geo-Hazards</b>	Slope Stabilization	<p>The Contractor shall be responsible for the following:</p> <ul style="list-style-type: none"> <li>• Final forming and re-vegetation will be completed by the Contractor as soon as possible following fill placement to facilitate regeneration of a stabilizing ground cover.</li> <li>• Trenching will be used where necessary to ensure successful</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor to implement mitigation</li> <li>• Engineer to routinely monitor Contractors activities.</li> </ul>

EMP: Construction Phase Mitigation			
Subject	Potential Impact/Issue	Mitigation Measure	Responsibilities
		<p>establishment of vegetation.</p> <ul style="list-style-type: none"> <li>Seeding with a fast growing crop and native seed mix will occur immediately after fill placement to prevent scour and to encourage stabilization;</li> <li></li> </ul>	
	Erosion	<p>The Contractor will be responsible for ensuing:</p> <ul style="list-style-type: none"> <li>Material that is less susceptible to erosion will be selected for placement around bridges and culverts.</li> <li>Re-vegetation of exposed areas including; (i) selection of fast growing and grazing resistant species of local flora; (ii) immediate re-vegetation of all slopes and embankments if not covered with gabion baskets; (iii) placement of fiber mats to encourage vegetation growth, although due to the arid conditions in most of the road, this may only be feasible where there is regular rainfall or other natural water supply.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
<b>Bridges and Waterways</b>	Demolition of existing structural components	<ul style="list-style-type: none"> <li>Contractor should provide additional measures to catch debris from falling into the river</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation measures; Engineer to check and ascertain correct results</li> </ul>
	Construction of superstructure	<p>No pillars are drilled into the river for bridge construction. Bridges will be constructed by slabs only. Therefore generation of turbidity plumes and sedimentation which could impact aquatic organisms can be excluded. No impacts are expected on River ecology.</p> <p>The Contractor shall ensure provision/or performance of the following:</p> <ul style="list-style-type: none"> <li>Excavation methodologies should be done to minimize stockpiling near flowing water;</li> <li>Temporary rock protection should be provided to prevent soil materials to be washed away.</li> <li>When casting structural elements on site, spillage into the water should be prevented by installing proper measures to catch any spill;</li> <li>Structural elements should be casted far from the river to prevent concrete mix from getting into the water.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation measures; Engineer to check and ascertain appropriate results are attained</li> </ul>
<b>Processing Plants and Campsites</b>	Water contamination	<p>Prior to construction start the SSEMP shall be submitted which ensures the following:</p> <ul style="list-style-type: none"> <li>Reinstatement of site after completion of works;</li> <li>Minimization of impacts regarding air quality and noise is prevented because the construction facilities are located at sufficient distance to any sensitive receptors;</li> <li>Waste water will be collected and safely disposed, therefore ground and surface water pollution from contractor's facilities is avoided.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation measures; Engineer to check and ascertain appropriate results are attained</li> </ul>
	Air Quality and noise issues		
	Contaminated effluents		
	Defacement of the topography		

EMP: Construction Phase Mitigation			
Subject	Potential Impact/Issue	Mitigation Measure	Responsibilities
	Resource Competition with village residents	<ul style="list-style-type: none"> <li>Complaints from communities should be properly and promptly responded to;</li> </ul>	
<b>Transportation of Construction Materials and Wastes</b>	Droppings of materials & wastes	<p>The Contractor shall ensure provision/performance of the following:</p> <ul style="list-style-type: none"> <li>Liquids transported to or from the sites should be placed in sealed containment;</li> <li>Soil, gravel and stone should be covered with tarp or any material that can effectively prevent the dropping;</li> <li>Drivers should abide by safe driving practices, especially through communities;</li> <li>Driver and Contractor's personnel should ensure that materials are being safely loaded, hauled and unloaded.</li> <li>Emergency spillage and clean-up procedure should be drafted by the Contractor and approved by the Engineer</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation measures; Engineer to check and ascertain appropriate results are attained</li> </ul>
	Spills from haul trucks		
	Dust from uncovered trucks		
<b>Biological</b>	Loss of flora	<p>The Contractor shall ensure the following conditions are met:</p> <ul style="list-style-type: none"> <li>Each tree removed by the Contractor should be replaced by at least two new saplings of the same species or other at suitable locations, all as designated by the tree owner. Tree translocation should be explored and done whenever feasible. Dead saplings should be replaced as soon as possible. No trees should be cut in the area without written permission from the Engineer.</li> <li>Supplying appropriate and adequate fuel in workers' camps to prevent fuel-wood collection from unauthorized sources.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
	Impacts to Fauna	Work crews should be alerted that faunal species should not be killed and be allowed to escape during work execution.	<ul style="list-style-type: none"> <li>Contractor to instruct his personnel not to harm wildlife</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
<b>Sensitive Areas</b>	Protecting BKNP	The Engineer to ensure there are no detrimental impacts to protected areas, particularly the BKNP, should the Contractor opt to open new borrow pits. The Contractor shall be required to obtain approval from the MoENRP and local concerned agencies.	<ul style="list-style-type: none"> <li>Contractor to obtain necessary permits</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
<b>Construction and Domestic Waste</b>	Waste in Construction Camps and other ancillary facilities	The Contractor will be required to coordinate all construction camp activities with neighbouring land uses. The Contractor shall also be responsible to maintain and clean-up campsites and respect the rights of local landowners. If located outside the RoW, written agreements with local landowners for temporary use of the property will be required and sites must be restored to a level acceptable to the owner within predetermined time period.	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
	Spoil	Under no circumstances shall the Contractor dump excess materials on	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> </ul>

EMP: Construction Phase Mitigation			
Subject	Potential Impact/Issue	Mitigation Measure	Responsibilities
		private lands without permission of the owner and approval from the Engineer. In addition, excess spoil shall not be dumped or pushed into rivers at any location unless in low volumes and agreed upon with the Engineer and with approval from the Concerned Agencies.	<ul style="list-style-type: none"> <li>Concerned Agencies to approve any waste disposal to the River.</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
	Inert Solid & Liquid waste	<p>The contractor shall be responsible for the following:</p> <ul style="list-style-type: none"> <li>Provide refuse containers at each worksite;</li> <li>Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal;</li> <li>Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process, and</li> <li>Collect and transport non-hazardous wastes to all approved disposal sites. The sites for waste disposal shall be agreed with the local municipal authorities and Concerned Agencies. A specialized company may be contracted, if available to ensure collection of domestic and general waste from camps and temporary storage areas and transportation to landfills approved and licensed by the Concerned Agencies.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> <li>Concerned Agencies to approve any waste disposal site.</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
	Asphalt	<p>Waste from the operation of asphalt should be managed properly.</p> <p>Reinstatement of the site will be done after the project completion according to the stipulations in the SSEMP.</p>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
	Hazardous Waste	Any hazardous waste will be collected and safely disposed according to the stipulations in the SSEMP. Disposal locations of hazardous wastes should be agreed with the Concerned Agencies. The Contractor shall collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at the temporary storage sites and further at the locations approved by Concerned Agencies or pass it to the licensed operator having environmental permit on operation of the hazardous wastes.	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> <li>Concerned Agencies to approve any waste disposal site.</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>
<b>Worker's Safety</b>	Worker Health & Safety	<p>The Contractor shall be responsible for provision of:</p> <ul style="list-style-type: none"> <li>Safety Training Program. A Safety Training Program is required and shall consist of an Initial Safety Instruction Course. All workmen shall be required to attend a safety instruction course within their first week on Site and Periodic Safety Training Courses.</li> <li>Safety Meetings. Regular safety meetings will be conducted on a monthly basis and shall require attendance by the safety representatives of Subcontractors unless otherwise agreed by the Engineer.</li> <li>Safety Inspections. The Contractor shall regularly inspect, test and maintain all safety equipment, scaffolds, guardrails, working platforms, hoists, ladders and other means of access, lifting, lighting, signing and guarding equipment. Lights and signs shall be kept clear of obstructions and legible to read. Equipment, which is damaged, dirty, incorrectly</li> </ul>	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>

EMP: Construction Phase Mitigation			
Subject	Potential Impact/Issue	Mitigation Measure	Responsibilities
		<p>positioned or not in working order, shall be repaired or replaced immediately.</p> <ul style="list-style-type: none"> <li>Safety Equipment and Clothing. Safety equipment and protective clothing are required to be available on the Site at all material times and measures for the effective enforcement of proper utilization and necessary replacement of such equipment and clothing, and all construction plant and equipment used on or around the Site shall be fitted with appropriate safety devices.</li> <li>First Aid facilities. A fully equipped first aid base shall be climatically controlled to maintain the temperature of the inside of the building at 20 degrees C. Arrangements for emergency medical services shall be made to the satisfaction of the Engineer.</li> </ul> <p>The Contractor shall coordinate with local public health officials and shall reach a documented understanding with regard to the use of hospitals and other community facilities.</p>	
	Sub-contractor's / Suppliers EMP Compliance	All sub-contractors/ suppliers will be supplied with copies of the SSEMP. Provisions will be incorporated into all sub-contracts to ensure the compliance with the SSEMP at all tiers of the sub-contracting. All sub-contractors will be required to appoint a safety representative who shall be available on the Site throughout the operational period of the respective sub-contract unless the Engineers approval to the contrary is given in writing. In the event of the Engineers approval being given, the Engineer, without prejudice to their other duties and responsibilities, shall ensure, as far as is practically possible, that employees of subcontractors of all tiers are conversant with appropriate parts of the SSEMP.	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Contractor to enforce compliance to his Subcontractors / Suppliers and shall be overall responsible</li> <li>Engineer to routinely monitor Contractors and sub-contractors activities.</li> </ul>
	HIV / AIDS Awareness	The Contractor shall subcontract with an Approved Service Provider to provide an HIV/AIDS Awareness Program to the Contractor's Personnel and the Local Community as soon as practicable after the Contractor's Personnel arrive at the Site but in any case within two weeks after the Contractor's Personnel arrive at Site and to repeat the HIV/AIDS Awareness Program at intervals not exceeding four months. All workers should be provided with HIV/AIDS paraphernalia and should have access to such at all times.	<ul style="list-style-type: none"> <li>Contractor to implement mitigation.</li> <li>Service Provider to implement training.</li> <li>Engineer to review program.</li> </ul>
Community Safety	Traffic Safety	It is important that truck drivers and equipment operators understand the importance of maintaining road safety especially at road junction points. Village access likewise should be accorded due focus for the safety of the general population, especially children, and farm animals. Proper coordination with the village should be done to effect road safety. Checking of safety aspects should be done continuously with safety reminder meetings and done regularly. Safety traffic signs and warning lights should be installed at appropriate locations; and flagmen should be assigned at critical spots. Monitoring of this aspect can be conducted jointly by the Contractors'	<ul style="list-style-type: none"> <li>Contractor to implement mitigation</li> <li>Engineer to routinely monitor Contractors activities.</li> </ul>

EMP: Construction Phase Mitigation			
Subject	Potential Impact/Issue	Mitigation Measure	Responsibilities
		<p>management and the Construction Supervision personnel.</p> <p>Truck drivers and equipment operators must be made to understand the importance of maintaining road safety especially at road junction points and along village roads for the safety of the general population, especially children, and farm animals. Proper coordination with the village leaders should be done to effect road safety. Checking of safety aspects should be done continuously with safety reminder meetings conducted regularly. This can be a joint activity of the Contractors' management and the Construction Supervision personnel.</p> <p>To minimize Risks at Railroad Crossing – Safety concerns at railroad crossing should be among the important focus of the Contractor. It will be important that the Contractor should ensure that impacts be minimized if not avoided to the railway operations as well as provide more safety measures in the surroundings. Method Statements should be submitted well in advanced for the evaluation of the Engineer.</p>	
	Road closures, existing bridge closure, diversions and blocking of access routes	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> <li>• He shall be responsible for provision of all road diversion signs and ensure that diversion roads do not impact negatively upon private lands.</li> <li>• Any diversions shall be agreed upon by the Engineer.</li> <li>• Notices of delays, due to blasting (if any), shall be posted in villages within ten kilometers of the blasting area so villagers can plan their travel times accordingly.</li> <li>• The Contractor should make blasting at a regular period in the day so that the population in the valley becomes aware of the most likely delay periods.</li> <li>• The Contractor shall be responsible for ensuring that all access routes are kept open during Project works for at least 50% of the day during construction works and 100% of the time after construction works are completed for the day. Any temporary existing bridge closure should be communicated to affected people ahead of time</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor to implement mitigation</li> <li>• Engineer to routinely monitor Contractors activities.</li> <li>• Contractor to provide plan for any existing bridge closure</li> </ul>
	Electrical Systems	During construction the Contractor shall ensure that all power lines be kept operational, this may include the provision of temporary transmission lines while existing poles and lines are moved. The only exception to this item will be during periods of blasting when HV power lines will be switched off for safety.	<ul style="list-style-type: none"> <li>• Contractor to implement mitigation</li> <li>• Engineer to routinely monitor Contractors activities.</li> </ul>
<b>Cultural, Historical Monuments and Archaeological Sites</b>	Impacts to Historical and archaeological areas	<p>To avoid potential adverse impacts to cultural, historic and archaeological resources, the Contractor shall:</p> <ul style="list-style-type: none"> <li>• Instruct his personnel to work with care near cultural monuments, and</li> <li>• In the event of unanticipated discoveries of cultural or historic artifacts (movable or immovable) in the course of the work, the Contractor shall</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor to implement mitigation</li> <li>• Engineer to routinely monitor Contractors activities.</li> </ul>

EMP: Construction Phase Mitigation			
Subject	Potential Impact/Issue	Mitigation Measure	Responsibilities
		take all necessary measures to protect the findings and shall notify the Engineer and the Concerned Agencies. If continuation of the work would endanger the finding, project work shall be suspended until a solution for preservation of the artifacts is agreed upon.	
Impact to Households	Impairment of access Livelihood Impact Hampered Mobility	During construction, access should be maintained by providing temporary detour, by-pass or diversion paths for vehicles and people in the area. This should be with proper notification and consultation with the local population	<ul style="list-style-type: none"> <li>Contractor to implement mitigation measures; Engineer to check and ascertain appropriate results are attained</li> </ul>
	Health and Nuisance	<ul style="list-style-type: none"> <li>Suppression of dust by regular spraying of soil at the site will be necessary.</li> <li>Noise should be minimized by equipping equipment with mufflers and proper maintenance.</li> <li>Usage of equipment should be scheduled in order to minimize noises.</li> <li>Blasting, if to be done, should be properly announced and safety measures to the people be implemented.</li> </ul>	
	Potential Employment difficulty	Contractor should be encouraged to hire local labour, including women in the 14 villages	



**Table 42: EMP – Operations and Maintenance Phase Mitigation**

<b>EMP Operational and Maintenance Phase Mitigation</b>			
<b>Subject</b>	<b>Potential Impact/Issue</b>	<b>Mitigation Measure</b>	<b>Responsibilities</b>
<b>Soils</b>	Erosion	Contracts stipulated that the Contractor shall be liable for a one year defects liability period. During this year the Concerned Agencies should undertake regular observational monitoring of the Project Road to ensure that engineering works and vegetation growth have prevented erosion impacts. If the Concerned Agencies discover any potential issues they shall report their findings to the RD who shall then make the Contractor responsible for final improvements. Final payments cannot be made until outstanding issues are resolved	<ul style="list-style-type: none"> <li>Concerned Agencies to monitor vegetation growth and erosion impacts during defects liability period.</li> </ul>
<b>Hydrology</b>	Impacts to hydrology and water quality as a result of construction activities	Impacts on hydrology and water quality may result at river crossings due to bridge construction activities. In this Project no pillars are drilled into the river bed for bridge construction. Bridges will be constructed by slabs only. Therefore generation of turbidity plumes and sedimentation which could impact aquatic organisms can be excluded. No impacts are expected on River ecology.	<ul style="list-style-type: none"> <li>not applicable</li> </ul>
<b>Air Quality</b>	Air quality impacts from Vehicle movements	Due to low traffic volumes no air quality impacts are expected during operational phase of the Project.	<ul style="list-style-type: none"> <li>Not applicable</li> </ul>
<b>Noise</b>	Noise from Vehicles	<p>The project contains mainly rehabilitation of the existing road. No major realignment or implementation of an additional traffic lane is envisaged and therefore no entitlement for noise protection or compensation exists in accordance to Georgian laws and regulation.</p> <p>The comparison of the existing noise levels and the calculation results shows that after opening of the road a slight decrease in noise levels are expected due to better surface conditions, which will be offset in approximately 10 years due to the expected traffic increase.</p>	<ul style="list-style-type: none"> <li>Not applicable</li> </ul>
<b>Geo-hazards</b>	Continuous presence of Geo-hazards	For general safety, geo-hazards should be continuously monitored and measures should be performed to prevent any hazardous incident.	<ul style="list-style-type: none"> <li>RD to monitor geo-hazard during the operational phase and provide measures to avoid occurrences of fatal incident</li> </ul>
<b>Biological</b>	Impacts to fauna	Motorist should be notified by road signs of their possible presence and prohibit harming them	<ul style="list-style-type: none"> <li>RD to install signs where wildlife may be expected and prohibit harming them</li> </ul>
	Protecting BKNP	Motorist should be notified by road signs of their proximity to BKNP	<ul style="list-style-type: none"> <li>RD to install signs to notify motorist of their proximity to the BKNP</li> </ul>
	Traffic Safety	Traffic regulations should be enforced at all times Traffic safety measures should be performed Regular maintenance should be done	<ul style="list-style-type: none"> <li>Police should enforce traffic regulations</li> <li>RD to install road safety signs and maintain the road</li> </ul>

**Table 43: EMP – Pre-construction Baseline Measurements**

<b>EMP: Pre-construction Baseline Measurement</b>					
<b>Issue</b>	<b>Mitigation</b>	<b>Locations</b>	<b>Schedule</b>	<b>Responsibilities</b>	<b>Reporting</b>
Water Quality Impacts due to construction works	The Contractor shall undertake baseline instrumental water quality measurements during the Pre-construction phase. Parameters to be monitored to establish a baseline include: <ul style="list-style-type: none"> <li>• Total Suspended Solids (TSS)</li> <li>• Biological Oxygen Demand (BOD)</li> <li>• Fecal coliform</li> <li>• Oil and grease or Total Petroleum Hydrocarbon (TPH)</li> </ul>	Baseline monitoring locations include: <ul style="list-style-type: none"> <li>• All locations where baseline measurements were done in this IEE. These are at 5 Sampling stations.:</li> <li>• Station 1 is located at the lower region of the Dzirula River; Stations 2 and 4 were tributaries of Chkherimela River; Station 3 is the mid-reach of the Dzirula-Kharagauli rivers; and Station 5 is the headwaters of Chkherimela River.</li> </ul>	Water quality baseline measurement shall be carried out before construction activities commence, as soon as possible after the acceptance of the Bid to determine current levels of the pollutants at the specified monitoring locations. Then measurements on a monthly basis during construction stage.	The Contractor shall engage a third party measuring contractor to undertake the baseline measurement and shall be approved by the by the Engineer and/or RD.	The measuring contractor shall provide his results to the Contractor and submitted to the Engineer prior to the start of Project works.
Air quality	The Contractor shall undertake baseline instrumental air quality measurements for the following parameters: <ul style="list-style-type: none"> <li>• Dust (PM 10 and PM 2.5),</li> </ul>	The recommended baseline monitoring locations include: <ul style="list-style-type: none"> <li>• All locations where baseline measurements were done in this IEE. This is</li> <li>• Dzirula School (km 2+743)</li> <li>• Sighandzile School (km 14+968)</li> <li>• Moliti Ambulatory (km 28+473)</li> <li>• Moliti school (km 29+032)</li> </ul> In addition at the Asphalt Plant location.	Air quality baseline measurement shall be carried out before construction activities commence, as soon as possible after the acceptance of the Bid to determine current levels of the pollutants at the specified monitoring locations.	The Contractor shall engage a third party measuring contractor to undertake the baseline measurement and shall be approved by the by the Engineer and/or RD.	The measuring contractor shall provide his results to the Contractor and submitted to the Engineer prior to the start of Project works.
Noise	The Contractor shall undertake baseline instrumental noise measurements during the Pre-construction phase.	The recommended baseline monitoring locations include: <ul style="list-style-type: none"> <li>• All locations where baseline measurements were done in this IEE. These are at the following locations:</li> <li>• Dzirula School (km 2+743)</li> <li>• Sighandzile School (km 14+968)</li> <li>• Moliti Ambulatory (km 28+473)</li> <li>• Moliti school (km 29+032)</li> </ul>	Noise baseline measurement shall be carried out before construction activities commence, possibly as soon after the acceptance of the Bid to determine current levels of the pollutants at the specified monitoring locations.	The Contractor shall engage a third party measuring contractor to undertake the baseline measurement and shall be approved by the by the Engineer and/or RD.	The measuring contractor shall provide his results to the Contractor and submitted to the Engineer prior to the start of Project works.

**Table 44: EMoP - Construction Phase Instrumental Monitoring**

<b>EMoP: Construction Phase Instrumental Monitoring</b>					
<b>Issue</b>	<b>Mitigation</b>	<b>Locations</b>	<b>Schedule</b>	<b>Responsibilities</b>	<b>Reporting</b>
<b>Air Quality</b>	<p>The Contractor shall establish routine Air Quality Monitoring throughout the construction period. The following parameter shall be monitored:</p> <ul style="list-style-type: none"> <li>Dust (PM 10 and PM 2.5),</li> </ul>	<p>At the locations of the baseline measurements and at the Asphalt Plant location. Baseline measurements were conducted at:</p> <ul style="list-style-type: none"> <li>Dzirula School (km 2+743)</li> <li>Sighandzile School (km 14+968)</li> <li>Moliti Ambulatory (km 28+473)</li> <li>Moliti school (km 29+032)</li> </ul>	Monitoring to be undertaken monthly during construction phase.	The Contractor shall hire an independent monitoring specialist to perform the monitoring activities.	The Independent monitoring Specialist shall provide his results to the Contractor and Engineer within three days of the sampling activity.
<b>Surface Water Quality</b>	<p>The Contractor shall ensure that routine surface water monitoring is undertaken throughout the construction period. Measured water quality parameters shall include</p> <ul style="list-style-type: none"> <li>Total Suspended solids (TSS)</li> <li>Biological Oxygen Demand (BOD)</li> <li>Conductivity</li> <li>Fecal coliform</li> <li>Oil and grease or Total Petroleum Hydrocarbon (TPH)</li> </ul>	<p>Baseline monitoring locations include:</p> <ul style="list-style-type: none"> <li>All locations where baseline measurements were done in this IEE. These are at 5 Sampling stations.:</li> <li>Station 1 is located at the lower region of the Dzirula River; Stations 2 and 4 were tributaries of Chkherimela River; Station 3 is the mid-reach of the Dzirula-Kharagauli rivers; and Station 5 is the headwaters of Chkherimela River.</li> </ul>	Monitoring to be undertaken monthly	Responsibilities – The Contractor shall hire an independent air quality monitoring specialist.	The Independent monitoring Specialist shall provide his results to the Contractor and Engineer within three days of the sampling activity.
<b>Noise</b>	<p>The Contractor shall ensure that routine noise monitoring is undertaken throughout the construction period. Parameters to be monitored to establish a baseline include: Laeq 1h (dBA) Average Daily Noise level</p>	<p>At the locations of the baseline measurements:</p> <ul style="list-style-type: none"> <li>Dzirula School (km 2+743)</li> <li>Sighandzile School (km 14+968)</li> <li>Moliti Ambulatory (km 28+473)</li> <li>Moliti school (km 29+032)</li> </ul>	Monthly throughout construction.	The Contractor shall hire an independent noise monitoring specialist.	The Independent monitoring Specialist shall provide his results to the Contractor and Engineer within three days of the sampling activity.

## 2. Implementation Arrangements

310. The overall responsibility for environmental protection lies with the Ministry of Environment and Natural Resources Protection (MoENRP). At the rayon or district level they are represented by their respective district agency, which is located within or near the towns. The MoENRP is charged with a task of providing national monitoring services that includes a monitoring network of baseline information on water sources. Compliance with the EMP will be undertaken by the Safeguards Specialist at the Supervision Consultant as part of his/her technical supervisory duties.

311. The Implementation arrangement for the IEE/EMP is as shown in the Table below.

**Table 45: IEE/EMP Implementation Arrangements**

Organization		Responsibilities
MIRD	RD, Safeguard Specialist Consultant (or Firm)	<ul style="list-style-type: none"> <li>• Preparing Environmental Management Plan (EMP) for SEE review</li> <li>• Periodic submission of environmental monitoring report to ADB for public disclosure</li> <li>• Establishing environmental classifications under ADB regulations &amp; determining need for project IEEs</li> <li>• Screening &amp; preparation of IEEs including cost estimates for mitigation measures &amp; monitoring plans</li> <li>• Conducting public consultations: Informing affected people and community focus groups before or during consultation in the early stage of IEE preparation and conducting continuing consultation during implementation in accordance with ADB and government requirements</li> <li>• Preparing IEEs for State Ecological Expertise (SEE) and obtaining IEE clearance (development consent approval) from SEE</li> <li>• Submitting to ADB first IEE and all IEEs</li> <li>• Ensuring tender documents will be updated with any changes to the EMP</li> <li>• Ensuring Contractor would be implementing and updating environmental mitigation and monitoring measures</li> <li>• Incorporating environmental requirements in civil work contracts</li> <li>• Ensuring that the Contractor will be performing water quality monitoring and reporting to the SEE and local governments</li> <li>• Ensuring the Contractors have access to the IEE reports</li> <li>• Ensuring that Contractors have fully implemented and completed the detailed project EMP and have submitted this to SEE for approval</li> <li>• Ensuring that the Contractor shall be undertaking remedial action when unexpected environmental impacts occur during implementation</li> <li>• Preparation and submission of quarterly reports to the SEE and ADB including i) compliance with ADB loan covenants and government regulations, ii) significant issues or changes in scope, iii) summary of monitoring report findings, and iv) required follow-up actions</li> <li>• Undertaking monitoring of operation and preparing monitoring reports every year for 4 years after construction</li> </ul>
	Environmental Safeguard Specialist	<ul style="list-style-type: none"> <li>• Overall coordination with government entities and supervision responsibilities</li> <li>• Approval of the management contract</li> <li>• Submission of IEEs for SEE approval</li> <li>• Monitoring and evaluation of the Program</li> </ul>
MoENRP Environmental Expert Group	SEE	<ul style="list-style-type: none"> <li>• Review of environmental clearance</li> <li>• Providing guidance for upholding environmental policy requirements</li> </ul>
ADB	Social and Environmental Sector	<ul style="list-style-type: none"> <li>• Reviewing first IEE and all IEEs</li> <li>• Disclosing reports over ADBs website (Responsibility of ADB Project Leader)</li> </ul>

Organization		Responsibilities
	Specialists	<ul style="list-style-type: none"> <li>• Reviewing quarterly reports &amp; taking necessary actions</li> </ul>
CSC Consultant	Environmental Specialist	<ul style="list-style-type: none"> <li>• Monitor's and supervises Contractor's compliance to the IEE/EMP</li> </ul>
Contractor	Project Manager & Environmental Staff	<ul style="list-style-type: none"> <li>• Ensures compliance to IEE/EMP</li> <li>• Draft SEMP</li> <li>• Regular Instrumental Monitoring</li> <li>• Reporting</li> </ul>
Local Govts		<ul style="list-style-type: none"> <li>• Coordination with RD and making key decisions on behalf of the community</li> </ul>

### 3. Institutional Assessment

312. The Roads Department has significant experience with managing road based transport systems in Georgia. The agency has accumulated experience through current and completed highway and road improvement and construction works throughout the country.

313. During the construction phase, the environmental management and monitoring tasks will be coordinatively implemented by the RD, Construction Supervision Consultant (CSC) and Contractor. The following are the personnel will be involved as follows:

- **PIU-RD Safeguard Specialist** – Oversight monitoring and evaluation of the project's environmental, health and safety performance levels. Conducts site inspection as needed and provide necessary evaluation of the project's implementation of EMP and compliance to local regulations.
- **Consultant International Environmental Specialist** – conducts periodic inspection of contractor's compliance to EMP and provides necessary assessment of periodic compliance and non-conformance/violations on environment, health and safety. Writes Bi-annual Environmental Monitoring Report for submission to PIU and ADB.
- **Consultant National Environmental Specialist** – Conducts regular monitoring of environmental situations at the project site and provide monthly environmental reports to the Consultant Project Manager (The Engineer). Coordinate closely with Consultant International Environmental Specialist regarding issues at the worksite, particularly non-compliance issues. Compile all monthly information for the International Environmental Specialist for the Bi-annual Environmental Monitoring Report. Coordinates any baseline measurements to be done by the Contractor.
- **Contractor's Environmental, Health and Safety Staff** – Technical staff delegated to ensure compliance of the construction process with the EMP. Drafts and submits project-specific EMP based on the Project EMP. Obtains any baseline measurements as required by the contract including periodic measurements within the construction period. He/she shall submit periodic reports on environmental, health and safety aspects of the project to the Engineer.

### 4. Environmental Reporting

314. The Contractor will submit monthly progress reports, which include a section on implementation status of environmental management measures. A separate environmental management and monitoring reports will be prepared by the Contractor's environmental staff and to be submitted to the Supervision Consultant's environmental local and international specialists. The CS local environmental specialist shall verify the reports of the Contractor's environmental staff and compile them for presentation to the CS international specialist who will come for periodic audit. The CS international specialist will draft the Bi-Annual Environmental Report and will submit them to the Client and ADB. The ADB will subsequently disclose it to the public upon receipt.

315. In general the Contractor's environmental management and monitoring reports will include the following: (i) compliance with ADB loan covenants and government regulations; (ii) significant issues or changes in scope; (iii) summary of monitoring report findings; (iv) required follow-up actions; and (v) conclusions.

## 5. Environmental Management Budget and Resources

### 5.1 Budget on Mitigation Measures

316. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal construction contract, so there will be no additional costs to be included in the EMP. Costs of design-related mitigation measures are included in the budgets for the civil works.

317. The primary impact that needs to be mitigated in the overall implementation of the project will be on the affected trees which were due to widening of the carriage way. These trees are mainly common trees such as ash, oak and maple. The RAP has identified individual trees to be cut. However in the vegetated areas, an estimate is presented based on accepted convention.

318. In order to have a higher degree of success for replacement of affected trees, 2 seedlings of the same or similar species is proposed to be planted. Accordingly, the estimated number of trees and cost for the affected trees to be substituted is shown below.

**Table 46: Number and Cost for Mitigation of Affected Trees**

#	Item	Unit	QTY	Remarks
1	Affected trees due to widening	each	1,578	Indicated in RAP for Cutting
2	<i>Total vegetated area within the Right of Way (RoW)</i>	<i>M<sup>2</sup></i>	<i>189,245</i>	<i>As indicated from field surveys</i>
	Estimated trees within the vegetated area of the RoW (for Cutting)	each	6,434	<i>Standard estimate defined as 34 each trees of 16-28 cm diameter on the 100 square meter of the vegetated (source: "Motor road construction", V.k. Nekrasov, and P.F Burlai" 1947)</i>
	<b>Total Trees</b>	<b>each</b>	<b>8,012</b>	<i>Estimate of Affected Trees (for Cutting replacement)</i>
	<b>For 1:2 Ratio of Replacement</b>	<b>each</b>	<b>16,025</b>	<b><i>Estimated Trees to be Planted</i></b>
	Average cost of Replacement	USD	9	
	<b>Total Cost</b>	<b>USD</b>	<b>151,593</b>	<b><i>Estimated Budget</i></b>

### 5.2 Budget on Monitoring Activities

319. The estimated cost for the environmental management and monitoring on the consultancy for the entire project construction period of two (2) years is shown in the Table below. This will include fees and other associated cost for management and monitoring of the construction sites and affected areas in the project road. In addition, the main Contractor shall undertake periodic parametric measurements as basis for action to improve their performance on the implementation of measures. Hence, a budget for periodic parametric measurements is hereby included in the Table below.

**Table 47: Budgetary Cost for Environmental Monitoring Requirements**

Item	Quantity	Unit Cost	Total Cost
<b>Implementation of EMP</b>		<i>US \$</i>	<i>US \$</i>
International Environmental Specialist (IES)	8 months	14,000	<i>42,000</i>
National Environmental Specialist (NES)	24 months	2,500	<i>60,000</i>
Others (travel, per diem, surveys/interviews, reporting, etc.)	LS	20,000	<i>20,000</i>
Periodic Parametric Measurements	24 months	6,000	<i>72000</i>
<b>Total</b>			<b><i>194,000</i></b>

## **K. Conclusions and Recommendations**

### **1. Conclusions**

320. The IEE/EMP-EMoP as part of the contract documents shall be adhered to by the Contractor. Accordingly, the Contractor shall require all his Sub-Contractors should follow also the EMP and such stipulations be shown in Sub-contracting agreements to be verified by the Engineer (or the CS Consultants).

321. The proposed Environmental Management and Monitoring Plans in this IEE will ensure that the good quality for surface water, air and noise in the general area is maintained, primarily during the construction phase. The focus of the assessment is to avoid (especially during design phase), reduce (during construction) and mitigate or compensate (also during construction) the impacts to physical and/or social environment. Adequate public consultations were done in introducing the project as well as presentation of environmental and community impacts and the stakeholder concerns were incorporated into the IEE. The IEE will be disclosed to the public and can be viewed on ADB websites.

322. Upon verification of the impacts in this IEE process, the project is maintained at Environmental **Category B**, since the predicted impacts are “site-specific, few if any of them are irreversible, and in most cases mitigation measures can be readily designed (SPS 2009) and to be incorporated in the detailed designs.

323. As per the Georgian Law, the proposed project will require permits from the government regulatory agencies: The Environmental Permit will be processed by the Roads Department with the Ministry of Environment and Natural Resource Protection after the IEE is cleared with the ADB.

### **2. Findings and Recommendations**

324. The environmental impacts of the Project Road have been assessed and described in the previous sections of this document. Potential negative impacts were identified in relation to design, location, construction and operation of the improved road. Mitigation measures have been developed for finalization in the detailed design phase, for implementation in the construction phase and subsequently for the operations phase to reduce all negative impacts to acceptable levels.

325. As per assessment in this IEE, the proposed Road Project is unlikely to cause any adverse environmental impacts since:

- (i) The proposed project activities are focused on the improvement and reconstruction of the road restricting the works along the Right-of-Way with the main intent to improve the quality of life and quality of environment of the impacted districts;
- (ii) The potential negative impacts associated with the design, construction and operation of the proposed Project activities will be temporary, and localized in extent and can be mitigated to acceptable levels;
- (iii) Sources of materials can be adequately investigated at the project sites and the projected excess cut materials will be sufficient to cover for the fill requirements. The materials can be stockpiled and stabilized in nearby areas without posing environmental issue, however subject to permission by legitimate owners;
- (iv) There will be no Project activities that will involve permanent or temporary loss of



- income and/or livelihood but rather redound to possible improvement of household earnings due to possible employment of local people in the construction;
- (v) No impact to the Borjomi-Kharagauli Natural Park due to the river and its elevation serving as buffer;
- (vi) The institutional framework has been developed to specify the procedural requirements and responsibilities to ensure environmentally sustainable implementation, i.e. involving RD (Client), CSC and Contractor; and
- (vii) All construction and operation activities will be monitored and reported by RD (by employing CSC) in accordance with the Environmental Monitoring Plan.

326. To ensure environmental and social safeguards, the IEE presents the following recommendations:

- (i) Design engineers should give due considerations to mitigate geo-hazards in their design. Geo-hazard design requirements as prescribed in the designs should be followed by the Contractor
- (ii) Strict monitoring of water quality and ensuring that the works and Contractor's facilities are not discharging contaminants to the environment, especially the rivers, streams, or any waterways;
- (iii) Ensure that turbidity control is optimized by coming up with siltation ponds, silt fence especially at bridge construction sites.
- (iv) Waste water treatment facilities and sewerage should be installed at camp sites;
- (v) Trees felled should be replaced by the same or similar species to a factor of 2 or more. Transplanting trees should be explored and done whenever feasible. Maintenance of tree species should be the responsibility of the Contractor. Dead saplings should be replaced as soon as possible. No trees should be cut in the area without written permission from the Engineer;
- (vi) Avoid any socio-economic impact. Conversely, the Contractor should find ways to hire labour from the communities.
- (vii) The IEE with the EMP/EMoP should be part of the Contract Documents for the construction works;
- (viii) The Contractor should develop his own Site Specific Environmental Management Plan (SSEMP) based on IEE/EMP within 30 days from the date of his commencement and have this approved by the Engineer;
- (ix) Baseline Instrumental Measurements (for water quality, air quality, and noise) should be done within the mobilization period
- (x) Periodic instrumental monitoring should be done according to the Environmental Monitoring Plan (EMoP);
- (xi) The Contractor should have in his organization a full-time environmental staff to ensure compliance to EMP, reporting, coordination and communication with the CSC environmental specialist;
- (xii) All the environmental reports should be promptly produced by the Contractor's environmental staff.
- (xiii) Evidence of Contractor's training, seminars on required topics of concern to include Health and Safety, HIV/AIDS, Grievance Redress Mechanism (GRM), etc. should be submitted to the Engineer.

327. It is important that the Contractor and his Subcontractor that successful implementation entails not only provision of the infrastructure but also preservation of the environment within the framework of Sustainable Development.

## ANNEXES:

### 1. Annex 1A - List of Attendees in the Public Consultations, 15 Nov. 2014

#### 1.1 For Kharagauli Public Consultation

#	saxeli, gvari Name, Surname	xelmowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
	Set 1				
1.	vardo WipaSvili Vardo Chipashvili		saRanZiles sajaro skola Sagandzile School	direqtori Director	577977472
2.	Lliana sebiskveraZe Liana Sebiskveradze		Kkulturuli centri center of culture	molare Cashier	593129244
3.	Llali vefxvaZe Lali Vefkhvadze		Kkulturuli centri center of culture	tqnikiuri muSaki technical worker	593198674
4.	Eeka tabataZe Eka Tabatadze		sabavSo baRi kindergarten	aRmzrdeli Teacher	591927946
5.	xaTuna tabataZe Khatuna Tabatadze		კულტურის განათლების სპორტის და ახალგაზღვდობის ცენტრი Center of culture, sports and youth	მთავარი სპეციალისტი Chief specialist	598228235
6.	ლელა შარიქაძე Lela Shariqadze		კულტურის განათლების სპორტის და ახალგაზღვდობის ცენტრი Center of culture, sports and youth	მთავარი სპეციალისტი Chief specialist	593514771
7.	თამარ თხელიძე Tamar Tkhelidze		კულტურის განათლების სპორტის და ახალგაზღვდობის ცენტრი Center of culture, sports and youth	მთავარი სპეციალისტი Chief specialist	555256501
8.	დალი ბალხამიშვილი Dali Balkhamishvili		მოსწ ახალგაზრდობის სახლი Youth house	ინგლ. ენის მასწავლებელი English teacher	598228235
9.	ნატალია ჭყონიძე Natalia Chkonidze		მოსწ ახალგაზრდობის სახლი Youth house	ხელგარჯილობის წრის ხელმძღვანელი Master classes in sewing	551998864
10.	მარინა თაბუკაშვილი		მოსწ ახალგაზრდობის სახლი	დამლაგებელი Office-cleaner	593779956

#	saxeli, gvari Name, Surname	xelmowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
	Marina Tabukashvili		Youth house		
11.	მაია ბლუაშვილი Maia Bluashvili		მოსწ ახალგაზრდობის სახლი Youth house	მათემატიკის წრის ხელმძღვანელი Teacher of mathematic	593575805
12.	ქეტევან ხარაძე Ketevan Kharadze		მოსწ ახალგაზრდობის სახლი Youth house	დირექტორი Director	558452846
13.	თინათინ კიკნაძე Tinatin Kiknadze		მოსწ ახალგაზრდობის სახლი Youth house	ორგანიზატორი Organizer	555765989
14.	ანა გაჩეჩილაძე Ana Gachechiladze		მოსწ ახალგაზრდობის სახლი Youth house	კომპიუტერის პედაგოგი Teacher of computer	593530006
15.	ლიკა დევდარიანი Lika Devdariani		მოსწ ახალგაზრდობის სახლი Youth house	ფსიქოლოგი Psychologist	593533608
16.	ციური ბლუაშვილი Ciuri Bluashvili		ცენტრ. ბიბლიოთეკა Library	წამყვანი სპეციალისტი Chief specialist	593365002
17.	მაკა გორგოძე Maka Gorgidze		მოსწ ახალგაზრდობის სახლი Youth house	პედაგოგი Teacher	557716902
18.	რუსუდან თაბუკაშვილი Rusudan Tabukashvili		მოსწ ახალგაზრდობის სახლი Youth house	საქმეთამმართველი Organizer	555916976
19.	გია ტალახაძე Gia Talakhadze		მოსწ ახალგაზრდობის სახლი Youth house	ბუღალტერი Accountant	593657994
20.	მაკა ველაშვილი Maka Velashvili		უმუშევარი Unemployed	უმუშევარი Unemployed	593657994
21.	ლაშა ნიკაბაძე Lasha Niqabadze		მოსწ ახალგაზრდობის სახლი Youth house	პედაგოგი Teacher	555153344
22.	ვაჟა ვეფხვაძე Vaja Vefkhvadze		საზ. ურთიერთობა Relation with society	წამყ. სპეციალისტი Chief specialist	599332123
	Set 2				
1.	მარინე გოგია Marine Gogia		მოსწ ახალგაზრდობის სახლი Youth house	პედაგოგი Teacher	593014433
2.	ნინო კაპანაძე		კვაზეთი ჩემი	ჟურნალისტი	593356580

#	saxeli, gvari Name, Surname	xelmowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
	Nino Kapanadze		ხარაგაული Newspaper My Kharagauli	Journalist	
3.	ნინო დოლიძე Nino Dolidze		მუზეუმი Museum	დირექტორი Director	55112249
4.	თეა გოჩიანი Tea gochiani		მუზეუმი Museum	გიდი Guide	571029653
5.	სოფო ჩუბინიძე Sophie Chubinidze		მუზეუმი Museum	რეგისტრატორი Registrar	593334100
6.	მარინა დევდარიანი Marina Devdariani		მუზეუმი Museum	ბუღალტერი Accountant	595734734
7.	იზა ვეფვაძე Iza vepvadze		ლიტ. თეატრი Theater	დირექტორი Director	557192332
8.	დალი მერაბიშვილი Dali Merabishvili		სამუსიკო სკოლა Music school	პედაგოგი Teacher	591994802
9.	ნონა ზურაბიანი Nona Zurabiani		მაჯორიტატი დეპუტატი Deputy	დეპუტატი Deputy	591933765
10.	ნინო ბუხნიკაშვილი Nino Bukhnikashvili		მუზეუმი Museum	მოადგილე Deputy	577671264
11.	ირმა დეკანოსიძე Irma Dekanosidze		მუზეუმი Museum	ექსკ.მძღოლი Driver	555779227
12.	მაია ჭკოიძე Maia Chkoidze		#2ბავშვი #2 kindergarten	მედა Nurse	593669142
13.	შორენა მანჯავიძე Shorena Mjavanadze		#2ბავშვი #2 kindergarten	აღმზრდელის თანამშრომელი Tutor Helper	221096
14.	ლალი მაგლაკელიძე Lali Maglakelidze		#2ბავშვი #2 kindergarten	აღმზრდელი Tutor	
15.	ელზა ბანცაძე Elsa Bantsadze		#2ბავშვი #2 kindergarten	აღმზრდელი Tutor	598440808
16.	მაია მჭედლიძე Maia Mchedlidze		#2ბავშვი #2 kindergarten	გამგე Manager	558414945
17.	ფათი ღონღაძე Pati Gongadze		#2ბავშვი #2 kindergarten	მზარეული cook	555367415
18.	ნანა მაღრაძე Nana Magradze		#2ბავშვი #2 kindergarten	აღმზრდელი Tutor	593996944
19.	ნათელა დევდარიანი Natela Devdariani		#2ბავშვი #2 kindergarten	აღმზრდელი Tutor	558573410

#	saxeli, gvari Name, Surname	xelmowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
20.	თამარ გაჩეჩილაძე Tamar Gachechiladze		#2ბავშვი #2 kindergarten	ლოგოპეტი Logopet	571212956
21.	ლუბა კამკამიძე Luba Kamkamidze		#2ბავშვი #2 kindergarten	მრეცხავი Washer	599332123
22.	ნორა ავალიშვილი Nora Avalishvili		ინდემწარმე The entrepreneur	ინდემწარმე The entrepreneur	593101350
	Set 3				
1.	ხათუნა გოგვერაძე Khatuna gogveradze		#1 ბავშვი ბავშვი #1 kindergarten	ბუღალტერი ბუღალტერი Accountant	221160
2.	ტაბატაძე მარინა Marina Tabatadze		სკოლამდელი დაწესებულება kindergarten	საქმეთა მართველი Manager	221699
3.	კალანდაძე შორენა Kalandadze Shorena		#1 ბავშვი ბავშვი #1 kindergarten	შესყ. მენეჯერი purchasing agent	221679
4.	ლალი შარაშიძე Lali Sharashidze		#1 ბავშვი ბავშვი #1 kindergarten	ლოგოპეტი Logopet	593788515
5.	ეკატერინე ჩუკერიშვილი Ekaterine chukerishvili		#1 ბავშვი ბავშვი #1 kindergarten	ინგლ. მასწავლებელი English teacher	555458568
6.	თამარ ოსანიძე Tamar osanidze		#1 ბავშვი ბავშვი #1 kindergarten	აღმზრდელი Tutor	5936741100
7.	ლალი სვანიძე Lali svanidze		#1 ბავშვი ბავშვი #1 kindergarten	მზარეული Cook	593107804
8.	თამარ ლაცაბიძე Tamar Latsabidze		სკოლამდელი დაწესებულება kindergarten		591713388
9.	მაია დევდარიანი Maia Devdariani		#1 ბავშვი ბავშვი #1 kindergarten	აღმზრდელი Tutor	577510770
10.	სოფო ლაცაბიძე Sofo Latsabidze		საბავშვო ბიბლიოთეკა Children's Library	გამგე Manager	555766037
11.	ვეფხვია ღონდაძე Vepkhvia Gongadze		სპ. მართველობის ცენტრი Center for Government	მენეჯერი Manager	56001004206
12.	მირანდა შავიძე Miranda Shavidze		გამგეობა Government	სპეციალისტი Specialist	595454873
13.	რობაქიძე ეკა		გამგეობა Government	მთავარი სპეციალისტი Chef Specialist	558351502
14.	ლია ფცქლიაძე Lia ptskliadze		გამგეობა Government	მთავარი	599852664

#	saxeli, gvari Name, Surname	xelmowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
				სპეციალისტი Chef Specialist	
15.	ზვიად არევაძე Zviad Arevadze		უმუშევარი Unemployed		593974620
16.	კამკამიძე დალი Kamkamidze Dali		გამგეობის წარმომადგენელი Representative from government		595957368
17.	კვინიკაძე ნანული Nana Kiknadze		გამგეობა Government	სპეციალისტი Specialis	5577577868
18.	ფათი ღონღაძე Pati Gongadze		გამგეობა Government	მთ. სპეციალისტი Chef Specialist	599852638
19.	კიკნაძე ლუიზა Kiknadze Louisa		კულტურის ცენტრი Cultural Center	მსახიობი Actor	577522252
20.	წიკლაური ნიკო Tsiklauri Niko		კულტურის ცენტრი Cultural Center		599589840
	Set 4				
1.	ნანა რევაზიშვილი Nana revazishili		#1 ბაგა ბავშვთა #1 kindergarten	გამგე Manager	593300252
2.	ნათია გოგსაძე Natia Gogsadze		#1 ბაგა ბავშვთა #1 kindergarten	ფსიქოლოგი Psychologist	557399331
3.	თეა ციცქიშვილი Tea Tsitskishvili		#1 ბაგა ბავშვთა #1 kindergarten	მეთეთრეულე Washer	599704611
4.	ვალენტინა წულუკიძე Valentina Tsulukidze		#1 ბაგა ბავშვთა #1 kindergarten	უფროსი მზარეული Chef Cook	551135902
5.	ხომასურიძე ლენა Lena Khomasuridze		#1 ბაგა ბავშვთა #1 kindergarten	თანამშრომელი Assistant	557203994
6.	ჯოხაძე ნანა Nana Jokhadze		#1 ბაგა ბავშვთა #1 kindergarten	აღმზრდელი Tutor	514003552
7.	გობიარი ლილი Lily gokhiari		#1 ბაგა ბავშვთა #1 kindergarten	დამლაგებელი office-cleaner	593509153
8.	ბოხვერაძე მაგული Bokhveradze Maguli		#1 ბაგა ბავშვთა #1 kindergarten	აღმზრდელი Tutor	593562096
9.	ხურსაძე ჟუჟუნა Khursadze Zhuzhuna		#1 ბაგა ბავშვთა #1 kindergarten	აღმზრდელი Tutor	59905870
10.	შარიძე ია Sharikdze Ia		#1 ბაგა ბავშვთა #1 kindergarten	აღმზრდელი Tutor	577348420
11.	ლურსმანიშვილი ტამარი Tamara lursmanishvili		#1 ბაგა ბავშვთა #1 kindergarten	აღმზრდელი Tutor	555547450


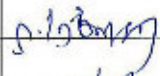
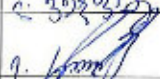
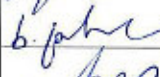
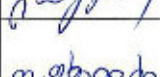
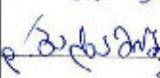
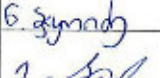
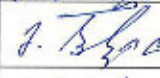

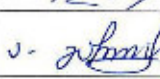
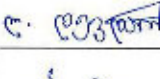
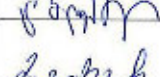
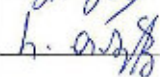
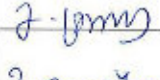
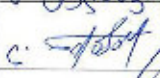





#	saxeli, gvari Name, Surname	xelmowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
12.	თაბუკაშვილი ია Tabukashvili Ia		#1 ბაგა ბალი #1 kindergarten	ალმზრდელი Tutor	555330315
13.	თამარ ავალიშვილი Tamar Avalishvili		#1 ბაგა ბალი #1 kindergarten	მეთოდისტი Methodist	555982340
14.	შარიკაძე ეკა Sharikadze Eka		#1 ბაგა ბალი #1 kindergarten	ალმზრდელი Tutor	592167975
15.	ფურცელაძე დიანა Diana Purtseladze		#1 ბაგა ბალი #1 kindergarten	ჭურჭლის მრეცხავი Dishwasher	598402990
16.	დეკანოსიძე ნათელა Dekanosidze Natela		#1 ბაგა ბალი #1 kindergarten	ექთანი Nurse	5933785389
17.	ყანჩაველი ირმა Irma Kanchaveli		#1 ბაგა ბალი #1 kindergarten	მუსიკის მასწავლებელი Music Teacher	555302095
18.	ლაცაბიძე ქეთინია Latsabidze ketinia		#1 ბაგა ბალი #1 kindergarten	ალმზრდელი Tutor	555245262
19.	ბარბაქაძე ნანა Nana Barbakadze		#1 ბაგა ბალი #1 kindergarten	ალმზრდელი Tutor	555591198
20.	სარალიძე თამარი Saraladze Tamari		#1 ბაგა ბალი #1 kindergarten	ალმზრდელი Tutor	97362727
21.	თამარ მაღრაძე Tamar Magradze		გაზეთი ახალი ხარაგაული Newspaper The new Kharagauli	ჟურნალისტი Journalist	551106006
22.	ვეფხვაძე ლალი Vepkhvadze Lali		საბავშვო ბიბლიოთეკა Children's Library	ისტორიკოსი Historian	558721224
	Set 5				
1.	ნაზი გველესიანი Gentle Gvelesiani		Kkulturuli centri Cultural centre	საქმეთა მართველი Manager	221938
2.	ეკატერინე ქველიძე Ekatherine Kvelidze		Kkulturuli centri Cultural centre	სპეციალისტი Specialist	555172241
3.	მარინე ოსანაძე Marine osanadze		Kkulturuli centri Cultural centre	სპეციალისტი Specialist	557961616
4.	მაია ვარდოსანიძე Maia Vardosanidze		Kkulturuli centri Cultural centre	სპეციალისტი Specialist	555190305
5.	ლალი ჭიპაშვილი Lali Tchipashvili		Kkulturuli centri Cultural centre	სპეციალისტი Specialist	593949395
6.	თამილა კირთაძე Tamila Kirtadze		Kkulturuli centri Cultural centre	სპეციალისტი Specialist	555742445
7.	მანანა ტოროშიძე Manana Toroshidze		გაზეთი ახალი ხარაგაული Newspaper The new Kharagauli	დირექტორი Director	558606507

#	saxeli, gvari Name, Surname	xelmowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
8.	ნანა მუხნიკაშვილი Nana mukhnikashvili		ცენტრალური ბიბლიოთეკა Library	ბიბლიოთეკარი Librarian	599442057
9.	ინგა ბერაძე Inga Beradze		ხარაგაულის გამგეობა Government of Kharagauli	მრჩეველი Advisor	555129947
10.	გ. ჩერქეზიშვილი G. Cherkezishvili		Kindergarten of Kharagauli	მეთეთრეულე Washer	593652326
11.	ეკა შველიძე Eka Shvelidze		ხარაგაულის მუზეუმი Museum of Kharagauli	დირექტორის მოადგილე Deputy Director	593658521
12.	ომარ ხუმასურიძე Omar Khumasuridze		დასუფთავების სამსახური Cleaning Service	მექანიკოსი Mechanical Engineer	555728455
13.	ზაალ ლურსმანიშვილი Zaal Lursmanashvili		დასუფთავების სამსახური Cleaning Service	წყალ სანტექნიკოსი Water plumber	593251939
	Set 6				
1.	ალექსანდრე ბარბაკაძე Alexander Barbakadze		სჯდ. ხარაგაული SJD. Kharagauli	დირექტორი Director	593273735
2..	თანარ კიკნაძე Tamar Kiknadze		ხარაგაულდასუფთავება Cleaning Service	საქმეთა მწარმოებელი Manager	595851889
3.	ლია ჩიტაშვილი Lia Chitashvili		ხარაგაულდასუფთავებ Cleaning Service	მთ. მენეჯერი Chef manager	558115821
	Set 7				
1.	ბადრი ჩაჩანიძე Badri Chachanidze		სახანძრო სამაშველო სამსახური Fire and Rescue Service	მეხანძრე მაშველი Firefighter Rescue	593551136
2..	გელა ტაბატაძე Gela Tabatadze		სახანძრო სამაშველო სამსახური Fire and Rescue Service	მეხანძრე მაშველი Firefighter Rescue	599523306
3.	ლამა ნანიტაშვილი		სახანძრო სამაშველო სამსახური Fire and Rescue Service	მეხანძრე მაშველი Firefighter Rescue	595454912
4.	დავით თაბუკაშვილი David Tabukashvili		სახანძრო სამაშველო სამსახური Fire and Rescue Service	მეხანძრე მაშველი Firefighter Rescue	557144259
5.	ფერაძე მარინე Marine Peradze		სახანძრო სამაშველო სამსახური Fire and Rescue Service	მეხანძრე მაშველი Firefighter Rescue	555324046



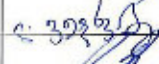

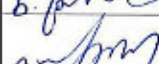
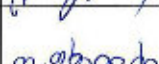
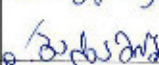
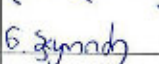
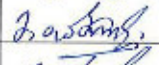
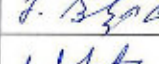
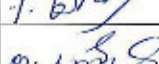
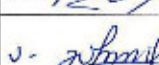


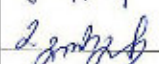
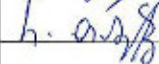
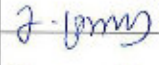
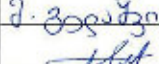






#	saxeli, gvari Name, Surname	xelmowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
	Set 8				
1.	შველიძე მაკა Shvelidze Maka		სათნოების სახლი Virtue House	direqtori Director	593983537
2.	ციცქიშვილი ნონა Tsitskishvili Nona		სათნოების სახლი Virtue House	ბუღალტერი Accountant	555732131
3.	ვეფხვაძე უშანგი Vepkhvadze ushangi		სათნოების სახლი Virtue House	სოც მუშაკი Social worker	557515660
4.	ბუაჩიძე ანრი Henri Buachidze		სათნოების სახლი Virtue House	სოც. შესყიდვების საკითხებ Social Purchase	555217624
5.	ვეფხვაძე თინათინი Vepkhvadze Tinatini		სათნოების სახლი Virtue House	საკმისმწარმოებელი Manager	597003390
6.	სახვაძე თამარი Sakhvadze Tamari		სათნოების სახლი Virtue House	დამლაგებელი office-cleaner	593496075
7.	ლომიძე ციური Lomidze Celestial		სათნოების სახლი Virtue House	დიასახლისი Housewife	593510150
8.	შუბითიძე დალი Shubitidze Dali		სათნოების სახლი Virtue House	დიასახლისი Housewife	557592302
9.	ეჯისხაძე ლილი Lily ejiskhadze		სათნოების სახლი Virtue House	ოფის მენეჯერი Office Manager	557592302
10.	აბაშიძე მაკა Abashidze Maka		სათნოების სახლი Virtue House	მედდა Nurse	593197393
11.	კვანტრიშვილი ქეთევანი Kvantrishvili Qethevani		სათნოების სახლი Virtue House	დიასახლისი Housewife	593768678
12.	გურგენიძე ელისო Gurgenidze Eliso		სათნოების სახლი Virtue House	დიასახლისი Housewife	558735633
13.	ხურსაძე ნაზი Gentle khursadze		სათნოების სახლი Virtue House	დიასახლისი Housewife	555491548
14.	ლურსმანიშვილი ნანა Nana lursmanishvili		სათნოების სახლი Virtue House	დირექტორის Deputy	593731759

**Set 1**

№	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	კიკიაშვილი		საერთაშორისო სავაჭრო	მენეჯერი	57457442
2.	თაბაგაძე		საერთაშორისო სავაჭრო	მენეჯერი	593129244
3.	ლევანოვი		საერთაშორისო სავაჭრო	მენეჯერი	593198674
4.	ვახაშვილი		საერთაშორისო სავაჭრო	მენეჯერი	591989946
5.	ხაბუაძე		საერთაშორისო სავაჭრო	მენეჯერი	599852617
6.	გოგიშვილი		საერთაშორისო სავაჭრო	მენეჯერი	593511471
7.	თაბაგაძე		საერთაშორისო სავაჭრო	მენეჯერი	555256501
8.	ბერიძე		საერთაშორისო სავაჭრო	მენეჯერი	598228235
9.	ვახაშვილი		საერთაშორისო სავაჭრო	მენეჯერი	551998864
10.	მამუკაშვილი		საერთაშორისო სავაჭრო	მენეჯერი	593-77-99-56
11.	ბერიძე		საერთაშორისო სავაჭრო	მენეჯერი	593375305
12.	ქადაგიშვილი		საერთაშორისო სავაჭრო	მენეჯერი	558452846
13.	თაბაგაძე		საერთაშორისო სავაჭრო	მენეჯერი	555765989
14.	ანა კახიძე		საერთაშორისო სავაჭრო	მენეჯერი	59353-00-06
15.	ლიპარიძე		საერთაშორისო სავაჭრო	მენეჯერი	59353-36-08
16.	ვახაშვილი		საერთაშორისო სავაჭრო	მენეჯერი	593365002
17.	მამუკაშვილი		საერთაშორისო სავაჭრო	მენეჯერი	557-76902
18.	ხაბუაძე		საერთაშორისო სავაჭრო	მენეჯერი	555-91-69-46
19.	ვახაშვილი		საერთაშორისო სავაჭრო	მენეჯერი	593-93-11-60
20.	მამუკაშვილი		საერთაშორისო სავაჭრო	მენეჯერი	59365-79-91
21.	ბერიძე		საერთაშორისო სავაჭრო	მენეჯერი	555153394
22.	ვახაშვილი		საერთაშორისო სავაჭრო	მენეჯერი	593-33-21-77



№	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	ვიქტორ ქაბაშვილი		საერთაშორისო სემინარები	დირექტორი	577374742
2.	გოგინა სიმონიძე		პროექტის კონსტრუქტორი	პროექტი	593129244
3.	ლევან ვაჟაშვილი		კონსტრუქტორი	პროექტი, მონტაჟი	593198674
4.	ეკა ცაბაძე		სამ. მართ.	მედიკალი	591-929946
5.	ხათუნა ცაბაძე		საერთ. კონსტრ. სამ. დ. მართ. სამ. დ. მართ.	მე. სემინარი	599852617
6.	როზა შიშკიძე		პროექტი, მონტაჟი, სემინარი	მე. სემინარი	593511471
7.	თამარ მხედრი		მონ. მართ. სამ.	ინჟინერი	555256501
8.	როლი ბარბაქაძე		მონ. მართ. სამ.	ინჟინერი	598228235
9.	ნაფილა ჭყონიძე		მონ. მართ. სამ.	ინჟინერი	551998864
10.	მარიამ მამუკაშვილი		მონ. მართ. სამ.	ინჟინერი	593-74-99-56
11.	მარიამ ზოგადი		მონ. მართ. სამ.	ინჟინერი	593575306
12.	ქეთევან ხაჩიძე		მონ. მართ. სამ.	ინჟინერი	558452846
13.	თინათინ კიკნაძე		მონ. მართ. სამ.	ინჟინერი	555765989
14.	ანა ვარდისაძე		მონ. მართ. სამ.	ინჟინერი	59353-00-06
15.	ლია დვინაძე		სემინარი	ინჟინერი	59353-36-08
16.	ნინო მუხომბერი		მონ. მართ. სამ.	ინჟინერი	593365002
17.	მედიკალი		მონ. მართ. სამ.	ინჟინერი	557-76902
18.	ნინო მამუკაშვილი		მონ. მართ. სამ.	ინჟინერი	555-91-69-46
19.	ნინო მამუკაშვილი		მონ. მართ. სამ.	ინჟინერი	593-93-11-60
20.	მედიკალი		მონ. მართ. სამ.	ინჟინერი	59365-79-94
21.	ნინო მამუკაშვილი		სემინარი	ინჟინერი	555153394
22.	მედიკალი		სემინარი	ინჟინერი	593-33-21-79



## Set 2

№	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	მარინე ვოვა	მ. ვოვა	მოს. ადგილის სსიპი	მედიკოსი	59301-443
2.	ნინო პანაძე	ნ. პანაძე	მოს. ადგილის სსიპი	მედიკოსი	593356580
3.	ნინო დიდიშვილი	ნ. დიდიშვილი	მოს. ადგილის სსიპი	მედიკოსი	555713249
4.	თეა ვახაშვი	თ. ვახაშვი	მოს. ადგილის სსიპი	მედიკოსი	571-02-96-53
5.	ხათუნო მუშაძე	ხ. მუშაძე	მოს. ადგილის სსიპი	მედიკოსი	593-33-41-00
6.	მარინე დიდიშვილი	მ. დიდიშვილი	მოს. ადგილის სსიპი	მედიკოსი	595-734-434
7.	იზა ვადაშვილი	ი. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	557192332
8.	დათო მუშაძე	დ. მუშაძე	მოს. ადგილის სსიპი	მედიკოსი	591-99-48-02
9.	ნინო ვადაშვილი	ნ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	591-93-37-65
10.	ნინო მუშაძე	ნ. მუშაძე	მოს. ადგილის სსიპი	მედიკოსი	577-67-12-64
11.	ნინო დიდიშვილი	ნ. დიდიშვილი	მოს. ადგილის სსიპი	მედიკოსი	555-7192-77
12.	მარინე ვადაშვილი	მ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	593669142
13.	მარინე ვადაშვილი	მ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	593669142
14.	დათო მუშაძე	დ. მუშაძე	მოს. ადგილის სსიპი	მედიკოსი	591-99-48-02
15.	იზა ვადაშვილი	ი. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	557192332
16.	მარინე ვადაშვილი	მ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	595-734-434
17.	მარინე ვადაშვილი	მ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	595-734-434
18.	ნინო ვადაშვილი	ნ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	591-93-37-65
19.	ნინო ვადაშვილი	ნ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	591-93-37-65
20.	მარინე ვადაშვილი	მ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	595-734-434
21.	მარინე ვადაშვილი	მ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	595-734-434
22.	ნინო ვადაშვილი	ნ. ვადაშვილი	მოს. ადგილის სსიპი	მედიკოსი	591-93-37-65



Set 3

Nº	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	სათუნა ბოგუჩაძე	ბ. გუგუ	მწ. სპ. პატი	პროექტორი	22-18-60
2.	თაბატაძე მარი	მ. თაბატაძე	მ(ა) სისკოვსკი	სამუშაო მძღოლი	22-16-99
3.	ვარდანაძე შოთა	შ. ვარდანაძე	მწ. სპ. პატი	მეც. მუშაკი	22-16-79
4.	ლუგოი იური	ი. ლუგოი	მწ. სპ. პატი	დოკუმენტი	593788545
5.	ქაფიშვილი ზურაბ	ზ. ზურაბ	მწ. სპ. პატი	ინჟინერი	555-45-58-68
6.	თამაზი თინათინ	თ. თინათინ	მწ. სპ. პატი	სამუშაო მძღოლი	593 674.100
7.	ლარი სვანიძე	ლ. სვანიძე	მწ. სპ. პატი	მმართველი	593 10 78 04
8.	თამაზი დავითი	თ. დავითი	მ(ა) სისკოვსკი	მმართველი	591 71 33 88
9.	შოთა თამაზი	შ. თამაზი	მწ. სპ. პატი	მმართველი	577510770
10.	სოფო დავითი	ს. დავითი	სამუშაო მძღოლი	მმართველი	555 766 037
11.	ვინოკურიძე	ვ. ვინოკურიძე	მწ. სპ. პატი	მმართველი	5600004200
12.	მხარაძე მარი	მ. მხარაძე	მმართველი	მმართველი	595754813
13.	სამუშაო მძღოლი	ს. სამუშაო მძღოლი	მმართველი	მმართველი	558 351509
14.	თამაზი დავითი	თ. დავითი	მმართველი	მმართველი	599 85 26 64
15.	თეიმურაზი დავითი	თ. თეიმურაზი	მმართველი	მმართველი	593974620
16.	შოთა დავითი	შ. დავითი	მმართველი	მმართველი	59595 73 68
17.	სამუშაო მძღოლი	ს. სამუშაო მძღოლი	მმართველი	მმართველი	557577868
18.	ბერიძე ბაძა	ბ. ბერიძე	მმართველი	მმართველი	599852638
19.	მამუკაძე დავითი	მ. მამუკაძე	მმართველი	მმართველი	577 52 0 58
20.	მამუკაძე დავითი	მ. მამუკაძე	მმართველი	მმართველი	599589840
21.					
22.					



## Set 4

№	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	ხათუნა ბოგვაძე	ბ. გუგუშვილი	მწიკი სპ. პარკი	პროექტორი	22-18-60
2.	დავით ბერიძე	მ. ბერიძე	საქართველოს მთავრობის ადმინისტრაცია	სამართლებრივი	22-16-99
3.	კახიკაძე შიგინა	მ. კახიკაძე	მწიკი სპ. პარკი	მეც. მუშაკი	22-16-79
4.	ლევან ბერიძე	ლ. ბერიძე	მწიკი სპ. პარკი	მთავარი	593788545
5.	დავით ბერიძე	დ. ბერიძე	მწიკი სპ. პარკი	ინჟინერი	535-45-58-68
6.	თამარ ბერიძე	თ. ბერიძე	მწიკი სპ. პარკი	ადმინისტრ.	593 674.100
7.	ლევან ბერიძე	ლ. ბერიძე	მწიკი სპ. პარკი	მთავარი	593-10-78-04
8.	თამარ ბერიძე	თ. ბერიძე	მწიკი სპ. პარკი	მთავარი	591 71 3388
9.	მთა ბერიძე	მ. ბერიძე	მწიკი სპ. პარკი	მთავარი	577510770
10.	სოფო ბერიძე	ს. ბერიძე	სამუშაო ბიძგოვანი	მთავარი	555466037
11.	ვინო ბერიძე	ვ. ბერიძე	სპ. მხ. ბერიძე	მთავარი	560000200
12.	მთა ბერიძე	მ. ბერიძე	მწიკი სპ. პარკი	მთავარი	575754813
13.	ლევან ბერიძე	ლ. ბერიძე	მწიკი სპ. პარკი	მთავარი	558 351509
14.	ლევან ბერიძე	ლ. ბერიძე	მწიკი სპ. პარკი	მთავარი	599852664
15.	თამარ ბერიძე	თ. ბერიძე	მწიკი სპ. პარკი	მთავარი	593974620
16.	მთა ბერიძე	მ. ბერიძე	მწიკი სპ. პარკი	მთავარი	59595 7368
17.	ლევან ბერიძე	ლ. ბერიძე	მწიკი სპ. პარკი	მთავარი	557577868
18.	მთა ბერიძე	მ. ბერიძე	მწიკი სპ. პარკი	მთავარი	599852638
19.	ლევან ბერიძე	ლ. ბერიძე	მწიკი სპ. პარკი	მთავარი	57752752
20.	მთა ბერიძე	მ. ბერიძე	მწიკი სპ. პარკი	მთავარი	599589840
21.					
22.					



Set 5

№	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	ნ. ს. გვარამია	ნ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	22-19-38
2.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	555 17-22-41
3.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	557-96-16-16
4.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	555 19-03-05
5.	ლ. ს. გვარამია	ლ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
6.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
7.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
8.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
9.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
10.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
11.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
12.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
13.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
14.					

Set 6

№	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
2.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
3.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
4.	მ. ს. გვარამია	მ. ს. გვარამია	საქ. უსწრ. სკოლა	საქ. მმ. მმ.	593 94-93-95
5.					



Set 7

Nº	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	ბადრი ჩხანითე		ხანანდითი-სამაშველი სამსახური	მხანდითი - მამაშველი	593 55 11 36
2.	ველია მუხამეძე		სახანდითი-სამაშველი სამსახური	მხანდითი - მამაშველი	599 52-33-06
3.	თაბა ნიკოლოზი		სახანდითი - ს.მ.მ.მ. ს.მ.მ.მ.	მხანდითი - მამაშველი	595-44-44-12
4.	დავით თამაშველი		სახანდითი სამაშველი სამსახური	მხანდითი მამაშველი	557-14-44-89
5.	ფრობე ზორიანი		სახანდითი სამაშველი სამსახური	მხანდითი მამაშველი	555-92-40-46
6.					

Set 8

Nº	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	მედიონი მაია		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	593-98-35-03
2.	სიმონიშვილი ნონა		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	555-78-21-31
3.	ვესტაძე უმანგი		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	557-54-56-00
4.	მუხამეძე ანდრო		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	553-21-76-21
5.	ვესტაძე თინათინ		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	594-00-33-90
6.	სახანდითი თამაზი		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	555-30-74-26
7.	ვინიძე რაფი		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	593-49-60-75
8.	მედიონი დავა		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	593-51-01-50
9.	ვესტაძე დიდი		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	557-59-23-02
10.	სახანდითი მაია		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	593-19-73-03
11.	ვესტაძე თინათინ		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	593-26-86-38
12.	ვესტაძე დიდი		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	558-73-56-33
13.	სახანდითი დავა		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	555-49-15-48
14.	ვესტაძე დიდი		მ.მ.მ.მ. - სახანდითი	მ.მ.მ.მ. - სახანდითი	593-73-17-59
15.					



## 1.2 For Moliti Public Consultation

#	saxeli, gvari Name, Surname	xemowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
1.	Jiuli kvinikiZe Djiuli Kvinikidze		umuSevari Unemployed	mRebavi Painter	790352140
2.	anzor lacabiZe Anzor Lacabidze		pensioneri pensioner	glexi peasant	8599981434
3.	merab talaxaZe Merab Talaxadze		xaragaulis deputati Deputy of Kharagauli	qoreografi Choreography	595600434
4.	Tengiz cxovrebaZe Tengiz Cxovrebadze		pensioneri pensioner		599968211
5.	soso TikanaSvili Soso Tikanashvili		umuSevari Unemployed		555660836
6.	giorgi lacabiZe Giorgi lacabidze		rkinigza Railway	muSa Worker	555675328
7.	avTandil mWedliZe Avtandil Mchedlidze		umuSevari Unemployed		551190497
8.	vladimer talaxaZe Vladimer Talakhadze		pedagogi Teacher		557671462
9.	gela talaxaZe Gela Talaxadze		reinjeri Ranger		577101859
10.	aleqsandre WyoiZe Aleksandre Chkoidze		t.e. specialisti Specialist of T.E.	moadgile Deputy	595371252
11.	nargizi amilaxvari Nargizi Amilakhvari		umuSevari Unemployed		557400936
12.	lia cucqiriZe Lia Cucqiridze		umuSevari Unemployed		790594544
13.	umanko maRraZe Umanko Magradze		pensioneri pensioner		790303358
14.	nikoloz lacabiZe Nikoloz Lacabidze		pensioneri pensioner		599457601
15.	goderZi RonRaZe Goderdzi Gongadze		pensioneri pensioner		555403120
16.	madona maWaraSvili Madona Macharashvili		biblioTeka Library	biblioTekari Librarian	555386815
17.	nana lomiZe Nana Lomidze		moliTis skola School of moliti	direqtori Director	577671484
18.	Sorena WyoiZe Shorena Chkoidze				599103514
19.	avTandil lacabiZe Avtandil Lacabidze				
20.	robizon mWedliZe Robizon Mchedlidze				599019994
21.	spartak lacabiZe Spartak Lacabidze		gamgeblis warmomadgeneli moliTSi Municipality of Moliti	Representative of municipality in Moliti	

№	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	სვინიძე ნიკოლოზ	ნ. სვინიძე	საქმის მართვა	მ. გ. გ. გ. გ.	790352410
2.	ლომინაძე ანდრე	ა. ლომინაძე	სახლის მართვა	ს. ლომინაძე	8599981434
3.	მუხომბე მუხომბე	მ. მუხომბე	მუხომბე მუხომბე	მ. მუხომბე	595-600-934
4.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	599 068811
5.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	55566-083
6.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	55566-083
7.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	551-19-04-94
8.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	577-621402
9.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	577-10-1859
10.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	195-3212-5
11.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	557 400 936
12.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	790 89454
13.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	790 3033-5
14.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	5994576076
15.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	555-40-31-02
16.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	555-38-68-15
17.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	577-67-1487
18.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	599-103514
19.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	
20.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	599019999
21.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	596117058
22.	მუხომბე მუხომბე	მ. მუხომბე	მ. მუხომბე	მ. მუხომბე	

### 1.3 For Chumateleti Public Consultation

#	saxeli, gvari Name, Surname	xemowera Signature	samuSao adgili Place of work	Tanamdeboba Position	telefoni Telephone
1.	<b>giorgi gerasaSvili</b> giorgi gerasashvili		<b>xaSuris municipalitetis</b> Municipality of Khashuri	<b>gamebeli</b> Head of municipality	599507028
2.	<b>Zurab CxituniZe</b> MMerab Chkhitunidze		<b>xaSuris municipalitetis</b> Municipality of Khashuri	<b>gameblis moadgile</b> deputy	598414441
3.	<b>Teimuraz lomuaSvili</b> Teimuraz Lomuashvili		<b>xaSuris municipalitetis</b> Municipality of Khashuri	<b>Zedamxedvelobis samsaxuris ufrosi</b> Head of Monitoring department	599770372
4.	<b>dimitri tamielaSvili</b> Dimitri Tamielashvili		<b>xaSuris municipalitetis</b> Municipality of Khashuri	<b>gameblis warmomadgeneli suramSi</b> Representative of municipality in Surami	599474109
5.	<b>kaxa barabaZe</b> Kakha Barabadze			<b>umuSevari</b> Unemployed	599125687
6.	<b>malxazi maisuraZe</b> Malkhaz Maisuradze			<b>umuSevari</b> Unemployed	
7.	<b>malxazi metreveli</b> Malkhazi Metreveli			<b>umuSevari</b> Unemployed	555122569
8.	<b>valeri Caduneli</b> Valeri Chaduneli			<b>umuSevari</b> Unemployed	598156069

№	სახელი, გვარი	ხელმოწერა	სამუშაო ადგილი	თანამდებობა	ტელეფონი
1.	გიორგი შაველი	გ. შაველი	მნიშვნელოვანი განყოფილება	გ. შაველი	599 10 70 28
2.	მუხომ მელიქიძე	მ. მელიქიძე	საქმის განყოფილება განყოფილება	მ. მელიქიძე	588 41 49 41
3.	თეიმურაზ ლომიძე	თ. ლომიძე	საქმის განყოფილება	თეიმურაზ ლომიძე	599 77 03 72
4.	გიორგი შიშკერი	გ. შიშკერი	საქმის განყოფილება	გიორგი შიშკერი	599 47 40 03
5.	სახი ხარბაძე	ს. ხარბაძე			599 12 56 87
6.	მ. ხარბაძე	მ. ხარბაძე			
7.	გ. ხარბაძე	გ. ხარბაძე		გ. ხარბაძე	599 27 92 62
8.	მ. ხარბაძე	მ. ხარბაძე		მ. ხარბაძე	555 12 25 69
9.	ვ. ხარბაძე	ვ. ხარბაძე	გ. ხარბაძე		598 15 60 69
10.					

## 2. Annex 1B - Open Forum Questions and Answers

QUESTION AND ANSWER			
#	Name	Question	Answer (By RD)
<b><u>I. Kharagauli</u></b>			
1	Teimuraz wkrialaZe Teimuraz Tskrialadze	aris mdinaris marcxniv meore gza da SesaZlebelia gamoyeneb iqnas SemovliT gza There is another road on the left side of the river and if is possible, to use that one as bypass road	ganvixilavT detaluri proeqtirebis dros It will be discussed during detailed design
<b><u>Moliti</u></b>			
1	merab talaxaZe Merab Talaxadze	gzis Seneblobis dros adgilobrivi dasaqmdebian? Local population will be employed during road construction or not?	kontraqtSi devs adgilobrivi dasaqmeba This issue will be considered in the Contract.
<b><u>Chumateleti</u></b>			
1	malxaz metreveli Malkhaz Metreveli	adgilobrivi dasaqmeba da sad iqneba asfaltbetonis qarxana da qvis samtvrevi ganTavsebuli Will there be employment for local population and where will the asphalt and crasher plants be located?	lika: Cven ver mivuTiTebT kontraqtors sad iyos qarxnebi, kontraqtSi devs adgilobrivi dasaqmeba We are not able to indicate the contractor location of plants, as of employment, the contract will consider this.
2	valeri Caduneli Valeri Chaduneli	1) xis Wram gaauaresa situacia fonaSi da wifaSi 1) Tree Cutting will be worse 2)wyalsacavebi aris soflis maxloblad romlidnac maragdeba soflebi wyliT da ar unda daingres 2)Water reservoirs are located nearby the villages and the villages are supplied from them, that's why they shouldn't be destroyed	aq iqnebian sazedamxedvelo firmebi da Tu raime problema geqnebaT mimarTeT maT There will be supervision firms who will address these Issues
3	malxaz maisuraZe Malkhaz Maisuradze	gzisqveSa ko munikaciebis ganlageba? The Location of underground communications should be ascertained so they will not be affected?	detaluri proeqtirebis dros gakeTdeba During detailed design this will be considered



3. **Annex 2 – Sample Complaint Form**



**GRIEVANCE REDRESS MECHANISM**

**COMPLAINT FORM**  
(sample only)

Date: \_\_\_\_\_ GRM Ref. No.: \_\_\_\_\_  
Project Component: \_\_\_\_\_ Received by: \_\_\_\_\_  
Complainant's Name/s: \_\_\_\_\_ Address: \_\_\_\_\_  
Signature/s: \_\_\_\_\_  
\_\_\_\_\_ Contact Nos.: \_\_\_\_\_

**Details about the Complaint:**

1. *What is the current situation:* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
2. *Background/ What happened?:* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
3. *Impacts to the Complainant:* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
4. *Complainant's opinion on remedies / solution:* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Note: Provide Additional Sheets as necessary**

**Initial Assessment:**

Nature & Category \_\_\_\_\_  
GRM Coordinator's Remarks/ Recommendations: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Proposed Action: \_\_\_\_\_  
\_\_\_\_\_

#### 4. *Annex 3 – GRM Registry Book*



**GRIEVANCE REDRESS MECHANISM REGISTRY BOOK**  
(sample only)

[illegible]