



Road Department
of the Ministry of Regional Development and Infrastructure of
Georgia

**Environmental and Social Impact Assessment
of Reconstruction of Gurjaani-Bakurtsikhe Bypass Road
Kakheti Regional Roads Improvement Project
and
Third Secondary and Local Roads Project**

Draft Final Report

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LIST OF ACRONYMS

AH	Affected households
AP	Affected people
CSC	Construction Supervision Consultant
CC	Construction Contractor
EA	Environmental Assessment
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
EWB	East-West Highway
GIS	Geographic Information System
GoG	Government of Georgia
GRC	Grievance Redress Committee
HSE	Health, Safety, Environment
HS	Health and Safety
HGV	Heavy Goods Vehicle
KP	Kilometer Post
MCMP	Ministry of Culture and Monument Protection
MENRP	Ministry of Environment and Natural Resource Protection
MESD	Ministry of Economy and Sustainable Development of Georgia
MLHSA	Ministry of Labor, Health and Social Affairs
NACHP	National Agency of Cultural Heritage Protection
NGO	Non-Governmental Organization
OP/BP	World Bank's Operational Policy / Bank Policy
QC/QA	Quality Control and Quality Assurance
RAP	Resettlement Action Plan
RD	Road Department of the Ministry of Regional Development and Infrastructure of Georgia
MENRP	Ministry of Environment and Natural Resources Protection
MRDIG	Ministry of Regional Development and Infrastructure of Georgia
RBG	Red Book of Georgia Protected Species
RD	Roads Department of the Ministry of Regional Development and Infrastructure of Georgia
RoW	Right of Way
SEP	Stakeholder Engagement Plan
ToR	Terms of Reference
WB	The World Bank
WHO	World Health Organization

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EXECUTIVE SUMMARY

Introduction

World Bank has been providing assistance to Georgia with the improvement of road assets and their management for many years. This assistance includes series of East-West Highway Improvement Projects, Secondary and Local Roads Projects, and the ongoing Kakheti Regional Roads Improvement Project. Environmental and Social Impact Assessment (ESIA) of the proposed reconstruction of Gurnaani-Bakurtskiske bypass road was carried out on the proceeds of the World Bank-financed KRRIP, while the physical works will be supported from the Third Secondary and Local Roads Project. This investment will improve road safety and capacity on the secondary road of Akhmeta-Telavi-Bakurtsikhe, leading Tbilisi. Improving roads in the Kakheti region is particularly important, as this part of the country has considerable agriculture and touristic potential. The construction of Gurjaani-Bakurtsikhe bypass road (approx. 15 km) is also part of Georgia's effort to increase the inter- and intra-regional connectivity of the road network and improve access to Tbilisi for a region with important agricultural and tourist potential. It will provide a shorter and safer route for the Telavi-Tbilisi traffic now using very narrow and density populated road Vaziani-Sagarejo-Bakurtsikhe-Gurjaani section.

During the late of 80's, before the break-up of the Soviet Union, the design of the Gurjaani-Bakurtsikhe bypass road was completed and some construction works started, but soon all works were put on hold due to financial constraints. At present, part of the road embankment and some artificial structures exist within the road alignment. Over the years of abandonment, the road corridor got heavily littered with waste from nearby settlements, including household waste, construction waste, and organic matter. The road corridor passes through rich agricultural areas with a predominance of vineyards and wine producing factories. This road corridor makes several river crossings.

Project Alternatives

Alternative 1 is the existing road, part of the secondary road, Akhmeta-Telavi-Bakurtsikhe (ATB road), one of the main roads in the Kakheti region. The existing road passes through densely populated areas and the section in question carries high volumes of heavy transit traffic, resulting in a high rate of road accidents. The idea of the by-pass road was based on avoidance of the densely populated settlements and improvement of traffic safety. Improvement of the existing road will cause Social complications, because the road had to be widened and many households along the existing road would be under the impact. It would not be possible to avoid disturbance of rest of population from noise and air pollution because of increased traffic.

Alternative 1 was not considered feasible.

Alternative 2 is to create a bypass connecting the international road Tbilisi-Bakurtsikhe-Lagodekhi (TBL road) with the existing secondary road, avoiding the town of Gurjaani and the villages Bakurtsikhe, Kolagi, Dzirakoki, Chandari, Vejini and Chumlaki. A design for bypassing these settlements was prepared in the late 1980s and construction commenced. However it got suspended later and remained abandoned till present. Although the existing roadbed and structures are seriously degraded, this alignment is clearly one of the most feasible bypass alternatives. The existing roadbed underpasses a railway; crosses a stream and a river; runs through three built up areas where individual buildings and a communications tower get in it way; and traverses agricultural land with intensive vine cultivation.

Alternative 2 was preferred to Alternative 1, but due to significant deficiencies, was not suitable either.

Alternative 3 offers variations to the Alternative 2. Variation-1 is at PK 71 to PK 92 of the Alternative 2. During the public meeting local population immediately objected this proposal, because the Green line pass through wine yards with very high value. At the same time this variation to be rejected because of impact on agro-biodiversity habitats.

Variation-2 of the route is required at the Chumlaki (PK 127 – PK 149) end of the alignment. Considerable building development has taken place since the original bypass route was established. Also the original bypass route approaches the existing main road at an oblique angle near the existing “at level” railway crossing. These factors make it difficult and disruptive to create a satisfactory junction at this termination point. An extension to the bypass route is proposed to create an alternative termination point closer to Telavi. It allows bypassing the recently developed area and allows creation of a satisfactory junction.

Alternative 3 with Variation-2 was selected.

Types of physical works to be undertaken

At the mobilization stage the selected contractor will arrange work camps, including sites for vehicle parking and material storage, and temporary access roads. The construction stage will include:

- Clearing the RoW;
- Preparing the RoW;
- Construction of carriageway and shoulders;
- Building a new bridge;
- Arrangement of drainage, signage, and other supporting infrastructure;
- Reinstatement of work area.

Environmental and Social risks and their mitigation measures associated with construction and operation of the road

The results of the ESIA show that majority of the potential environmental impacts of works on Gurjaani-Bakurtsikhe bypass are associated with the construction phase and are temporary in nature. The main approach of the ESIA was to provide adequate recommendations for the prevention or mitigation of negative environmental and social impacts of the proposed works. These recommendations are applicable during road design, construction, and operation phases. Taking into account the location and sensitivity of human settlements and environmental receptors, the following mitigation measures were developed for mitigating the main risks associated with the road construction:

- Impact on vegetative cover: Clearing of the right of way, especially in the re-aligned parts of the highway, will imply removal of vegetation, including cutting of trees. Loss of vegetation will be kept at the possible minimum. The trees removed from the State owned areas will be compensated through re-planting along the right of way at a ratio of 1:3, and those cleared from private land plots will be compensated in accordance with the Resettlement Action Plan. R o a d s D e p a r t m e n t (RD) will be responsible for further maintenance of plantations.
- Disturbance of local communities: Movement of construction machinery, location of the temporary work camps, and temporary storage of construction materials and waste will be planned to avoid or minimize barriers for free movement of the local population. Operation of construction machinery will be limited to the regular working hours.
- Operation of work camps and access roads: Work camps and temporary access roads will be located preferably in the already transformed areas to minimize landscape and ecosystem

degradation.

- **Air pollution:** Air pollution can appear during earthworks, gravel crushing, concrete mixing, and transportation in case of improper maintenance and operation of equipment, inadequate storage of fine-grained materials, and movement of vehicles on unpaved or dusty surfaces. To reduce generation of dust and reduce emissions, construction equipment will be maintained in good working condition and mixing equipment will be sealed. Concrete mixing plants will be installed at least 300 m away from settlements windward. Speed limits will be set for construction vehicles and all loose material will be covered with tarpaulins when transported off-site with trucks. A wheel-washing facility will be provided and ensured that it is used by all vehicles before leaving all sites. All unpaved roads and significant areas of uncovered soil will be sprinkled during working hours in dry weather conditions.
- **Operation of construction machinery:** The technical condition of the construction machinery will be checked on regular basis to minimize air pollution from exhausts oil and soil/water pollution from leakage of fuel.
- **Earth works:** Prior to excavation, top soil will be removed and stored separately for later reinstatement of the area. Landscape restoration will be carried out to ensure stabilization of slopes. This would include seeding of grass and planting trees.
- **Construction of bridge and bank protection structure:** Works in the waterways will be planned to avoid construction during fish spawning periods (June-September). River banks will be checked for stability in the course of works and reinforced as necessary to minimize erosion.
- **Accumulation of construction waste:** Temporary storage of waste will be organized by separating construction debris, household solid waste, and hazardous waste. The latter, comprising of used filters, tires, and lubricants from machinery, will be kept in a closed and isolated storage. Out transportation of waste from the construction sites will follow a time-bound schedule. Formal instructions will be obtained from local authorities for the final disposal of waste in the existing landfills. Hazardous waste will be removed/utilized by licensed contractor.
- **Operation of quarries and borrow pits:** Purchase of inert construction materials will be allowed only from the licensed legal and/or physical bodies. Extraction of these materials will also be allowed on the grounds of a special license. Opening of new borrow pits will be avoided if those already in operation can be used instead. Operation of quarries and borrow pits, as well as extraction of gravel from river terraces, will be carried out strictly in accordance with the conditions of a license.
- **Historical, cultural, and archaeological sites:** All known historical and cultural monuments along the right of way were identified and mapped during the ESIA. The Highway alignment will not cause physical damage to these monuments. There is a likelihood of chance finds during earth works, though. If an artefact is encountered by a works contractor, all activities on site will be immediately taken on hold and the National Agency for Cultural Heritage Protection (NACHP) will be urgently notified. Works will resume only upon receipt of written communication from NACHP.
- **Occupational health and safety:** Work camps will be established and operated to ensure the maintenance of adequate hygiene and sanitation. Workers and other personnel involved in the project will be provided with personal protection equipment and gear.
- **Resettlement and land acquisition** will be addressed through implementation of a Resettlement Action Plan.

Public Disclosure and Consultation on the ESIA Report

Present draft ESIA report, in Georgian and English languages, will be posted on the web site of the Roads Department (RD) of the Ministry of Regional Development and Infrastructure of Georgia. Hard copies of the document will be available at Gurjaani and Bakurtsikhe local administration offices. RD will organize a public consultation meeting to discuss the draft ESIA report as well as the draft Resettlement Action Plan (RAP). ESIA report, finalized after receiving stakeholders' feedback and with minutes of consultation process attached, will be re-disclosed country-wide through RD's web page.

Environmental Management Plan

Environmental Management Plan (EMP) for the rehabilitation of Gurjaani-Bakurtsikhe bypass is a part of present ESIA report. EMP carries a detailed set of measures for mitigating negative environmental and social impacts of the proposed works, provides information on the parties responsible for applying these measures and overseeing their application, and sets forth arrangements and methodology for monitoring implementation of EMP.

Overall responsibility of the implementation of EMP lies with RD. It is expected that RD will use consultant services for technical supervisor of works and that this task will include oversight on environmental and social performance of works contractor.

Operation of Gurjaani-Bakurtsikhe Bypass

The reconstructed Gurjaani-Bakurtsikhe bypass road will be on the balance of RD. After completion of works, RD will be responsible for its future operation and maintenance.

1. INTRODUCTION

This assignment is financed under World Bank-financed Kakheti Regional Roads Improvement Project. The Project will continue to assist in improving road safety and capacity on the secondary road of Akhmeta-Telavi-Bakurtsikhe leading Tbilisi. Improving roads in the Kakheti region is particularly important, as this part of the country has considerable agriculture and touristic potential. The construction of Gurjaani-Bakurtsikhe bypass road (approx. 15 km) is also part of Georgia's effort to increase the inter- and intra-regional connectivity of the road network and improve access to Tbilisi for a region with important agricultural and tourist potential. It will provide a shorter and safer route for the Telavi-Tbilisi traffic now using very narrow and densely populated road Vaziani-Sagarejo-Bakurtsikhe-Gurjaani section.

During the late of 80's, before the break-up of the Soviet Union, the design of the Gurjaani-Bakurtsikhe bypass road was completed and some construction works started, but soon all works were put on hold due to financial constraints. At present, part of the road embankment and some artificial structures exist within the road alignment. Over the years of abandonment, the road corridor got heavily littered with waste from nearby settlements, including household waste, construction waste, and organic matter. The road corridor passes through rich agricultural areas with a predominance of vineyards and wine producing factories. This road corridor makes several river crossings.

The Akhmeta–Telavi–Bakurtsikhe road is one of the main roads in the Kakheti region. The 14 km section of the road between Bakurtsikhe and Chumlaki passes through densely populated areas. There are capacity, safety, vibration, air and noise pollution constraints caused by the necessity to restrict vehicle speeds in the populated areas. These will be exacerbated by traffic growth. The problem has long been acknowledged, and was addressed in the 1980s when partial construction of a bypass was undertaken: the work was not completed due to socio-economic problems at the time.

A two lane bypass is envisaged, with roundabouts proposed at the termination points Km 0 (Bakurtsikhe) and Km 15. Roundabouts are also proposed at two key intersections, Km 9.6 and Km 13.15: elsewhere underpasses are proposed for the major routes intercepting the bypass alignment, to maintain local traffic patterns but without allowing intermediate access to the bypass, in order to ensure an optimal traffic flow on the bypass. A further roundabout is envisaged (near Km. 1.7) at a later date, to connect to the proposed Bakurtsikhe – Tsnori highway. The bypass will generally be constructed within the right of way acquired in the 1980s: the main exception being provision of a new and longer section to provide a new termination point at the Chumlaki end, avoiding an area built up and developed since the 1980s.

Forecast traffic flows (according to study performed by *Roughton International*) on the bypass, projected in three bands (corresponding to high, medium and low traffic growth rates) are shown below:

Table 1.1: Forecast Traffic Flows ADT

YEAR	LOW	MEDIUM	HIGH
2018	5,849	6,078	6,313
2020	6,326	6,701	7,093
2025	7,550	8,390	9,314
2030	8,667	10,013	11,662
2035	9,806	11,607	14,189
2037	10,303	12,314	15,347

The selected alternative, in terms of reduction of safety, vibration, air and noise pollution constraints will have positive social and environmental effect. Proposed alignment will avoid all settlements from Bakurtsikhe to Chumlaki and forecasted increased traffic flow on the international road Tbilisi–Bakurtsikhe–Lagodekhi–Azerbaijan Border will not affect by-passed populated areas.

At the same time it must be mentioned that the project does not impinge on protected areas, parks or ecologically sensitive areas. No threatened or endangered species inhabit the area. There appears to be no danger of disruption of archaeological remains. The present ESIA document deals fully with these matters.

The principal concern arising from the social studies associated with preparing the Resettlement Action Plan was that 47 structures, 350 households, 1614 peoples (788 male and 826 females) will be affected by the project. Concern was expressed by the project affected community that a proposed variation to the original 1980s bypass alignment, between Km 7.2 and Km 9.0, would adversely impact agricultural activity in that area. These concerns were respected during alignment finalization and that proposed variation was omitted.

2. LEGAL AND POLICY FRAMEWORK

Gurjaani-Bakurtsikhe bypass road will be reconstructed on the proceeds of the World Bank loan, and based on the legal agreements between Georgia and the World Bank, preparation and implementation of all related activities shall comply with both – the national legislation and the World Bank rules. In cases when these two sets of regulations have differing requirements in regards to the same activity, the course of action shall follow rules which are more stringent.

When one or more World Bank group members are involved in a project, "The Environmental, Health and Safety (EHS) Guidelines" are applied as required by their respective policies and standards. The ESIA for Gurjaani-Bakurtsikhe bypass road was performed according to the requirements of the EHS Guidelines for Local Roads together with the General EHS Guidelines document (International Finance Corporation, WB group, April 30, 2007).

The overall ESIA was performed according to recommendations given in WB technical paper No. 376 "Roads and the Environment. A Handbook" (1997).

The World Bank environmental and social safeguards include OP/BP 4.01 Environmental Assessment (1999), 4.04 Natural Habitats (2001), 4.36 Forests (2002), 4.11 Physical Cultural Resources (2006), 4.12 Involuntary Resettlement (2001) and others.

The requirements of the Georgian EIA system are set forth in the laws on Environmental Impact Permit (2007), Ecological Expertise (2007), Licenses and Permits (2005) and others; and guidance is available from the Ministry of Environment and Natural Resources Protection (MENRP). All the named laws together with laws and regulations on the water, soil and air including relevant quality standards have been applied.

2.1 World Bank Safeguard Policies Applicable to Gurjaani-Bakurtsikhe Bypass Reconstruction

Physical works for the reconstruction of Gurjaani-Bakurtsikhe bypass will be financed from the proceeds of the Third Secondary and Local Roads Project (SLRP-III). SLRP-III triggers two safeguard policies of the World Bank and is classified as environmental Category B. Works designed for the reconstruction of Gurjaani-Bakurtsikhe bypass carry medium environmental and social risks. They will not cause significant, complex and irreversible negative impacts. Therefore, these works fall under environmental category B and are eligible for funding from SLRP-III.

Safeguard policies triggered by SLRP-III are OP/BP 4.01 Environmental Assessment and OP/BP 4.12 Involuntary Resettlement. The ESIA was carried out and the present report is developed according to the requirements of OP/BP 4.01 and the Environmental and Social Management Framework of SLRP-III. Following the same rules, physical works for reconstruction of Gurjaani-Bakurtsikhe bypass will be implemented in compliance with the Environmental Management Plan (EMP) attached to the present ESIA report.

In addition to the OP/BP 4.01, development of the ESIA report and EMP followed also the EHS Guidelines for Toll Roads together with the General EHS Guidelines document (International Finance Corporation, WB group, April 30, 2007) and the World Bank's technical paper No. 376 "Roads and the Environment. A Handbook" (1997).

Requirements of OP/BP 4.12 and the Resettlement Policy Framework of SLRP-III are respected by the preparation of a Resettlement Action Plan for the reconstruction of Bakurtsikhe-Gurjaani bypass, which is a self-standing assignment and is being undertaken separately from this ESIA report.

2.2 National Environmental Legislation

Environmental legislation of Georgia comprises the Constitution, environmental laws, international agreements, by-laws, presidential decrees, ministerial orders, instructions, regulations, etc. Georgia is a party to international conventions, including the environmental ones. Below is a list of Georgia's environmental legislation as it pertains planned works on Gurjaani-Bakurtsikhe road:

Table 2.1 List of environmental laws and regulations relevant to the project planned works on Gurjaani-Bakurtsikhe road

Year	Law / Regulation
1994	Law on Soil Protection (amend. 1997, 2002)
1996	Law on Entrails (amend. 1999, 2002, 2004, 2005)
1996	Law on Environmental Protection (amend. 2004)
1997	Law on Wildlife (amend. 2001, 2003, 2004)
1997	Law on Water (amend. 2003, 2004, 2005, 2006)
1999	Law on Protection of Atmospheric Air (amend. 2000, 2007, 2008)
1999	Forestry Code of Georgia (amend 2000 2001, 2003, 2005, 2006)
1999	Law on Compensation of Damage from Hazardous Substances (amend 2002, 2003)
2002	Regulation on Environmental Impact Assessment approved by Order No. 59 of the Minister of Environment.
2005	Law on Red List and Red Book of Georgia (amend. 2006)
2005	Law on Licenses and Permits
2007	Law on Environmental Impact Permit
2007	Law on Ecological Expertise
2007	Law on Service of Environmental Protection
2007	Law on Public Health
2011	Methodology for Estimation of Environmental Damage
2012	Product Safety and Free Circulation Code
2014	Living Genetically modified organisms
2015	Waste Management Code

Laws and regulations related to social and land ownership aspects applicable to the planned works on Gurjaani-Bakurtsikhe road t include:

Table 2.2 List of social and land ownership related laws relevant to the planned works on Gurjaani-Bakurtsikhe road ¹

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

Other laws relevant to the planned works on Gurjaani-Bakurtsikhe road

Table 2.3 Other laws relevant to the project

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

Road construction related regulations in force in Georgia. Design of bridges, viaducts, overpasses and pipes is regulated by norms and rules 2.05.03-84.

Construction norms and rules (SNR 2.05.02-85 Motor roads) regulate traffic safety, environmental issues, set forth main technical and traffic operation norms, crossings and inter-sections, paving aspects, etc.

¹ A comprehensive analysis of regulations applicable to land acquisition and resettlement is included in the Resettlement Action Plan

According to this document for category II road² the following environmental aspects are distinguished:

- the distance to residential area must be at least 50m from the edge of the carriage way;
- along with environmental impacts technical and economic aspects must be taken into account;
- prior to arrangement of temporary infrastructure and preparation of road embankment, topsoil must be removed and stockpiled until subsequent use for re-cultivation after completion of construction and removal of all temporary facilities;
- in case the road is built near the residential area (in a distance of 50 m), noise reduction measures (speed reduction) must be allowed for. For this purpose, shield walls, plant barriers, etc. may be suggested.
- road along the rivers must be built with consideration of protection zone boundaries for the surface water bodies.

2.3 Environmental permitting procedure – National and WB regulations

Proposed reconstruction of Gurjaani-bakurtsikhe bypass road includes building part of the road along fragments of the existing base and construction of new sections. According to the national legislation, issuance of a construction permit is expected to include environmental permitting based on the conducted Environmental Impact Assessment (ESA). Furthermore, building of the road implies laying of asphalt and the selected Contractor may need to install a new asphalt plant in the area. According to the national legislation, operation of an asphalt plant needs an environmental permit to be issued by the MENRP.

All procedures required for obtaining of an environmental permit are set forth in the ***Law of Georgia on Environmental Impact Permits*** and include the following steps:

Step 1. Publication of information on the project in central and regional newspapers. The advertisement has to include the project title, location, place and the date, time and venue of public disclosure meeting(s). It will also identify locations where the ESIA can be reviewed and where comments may be submitted.

Step 2. Within one week after publishing the information in the newspapers, the proponent will submit the ESIA report (hard copy and electronic version) to the Ministry of Environment Protection. A period of 45 days is allowed for receiving public comments on the ESIA. Between 50 and 60 days after publication, a series of meetings to receive comments from the stakeholder (which may include government agencies, local authorities, NGOs, community members) must be carried out. Within five days of the meetings, minutes of the meetings (summary of comments and discussions) are to be submitted to the Ministry of Environment Protection.

² Road categories are attributed according to daily intensity of traffic: category I – 7000 vpd; category II – 3000-7000 vpd; category III – 1000-3000 vpd; IV – 100-1000 vpd; V – up to 100 vpd

Step 3. All comments received from the stakeholders at the meeting or in writing will be reviewed and addressed in the final version of the ESIA. A copy of all written comments, the minutes together with the comment-response section will be included in the final ESIA as an Annex. The final ESIA report will be submitted to the Ministry of Environment and Natural Resources Protection (MENRP) and made available to the public, along with a project location map, an executive summary, of the planned development, reports on emissions and allowable limits. The permit will then be issued or denied within 20 days from registration of the submission.

According to the national regulations (Law on Construction permit, 2004; Law on Licenses and permits 2005) construction/ modernization of highway requires Construction Permit. (Procedures for obtaining the permit are described in the Law of Georgia of Construction permit.)

According to the national legislation administrative body issuing the permit (the Ministry of Economy and Sustainable Development) ensures involvement of the other Ministries including the Ministry of Environment Protection in permitting process. For the project subjected to construction permit, authorization (construction permit) incorporates elements of environmental impact permit.

Environmental impact permit is required for running asphalt/concrete plant and should be obtained from the MENRP. License for use of natural resources – in case decision is made to use own quarry - is required and should be obtained from the National Environment Agency of the MENRP. Temporary disposal of inert construction waste and unusable asphalt are regulated based on agreements with local municipal authorities. Locations of the final disposal of excess material are suggested by local municipalities and their suitability is confirmed by the MENRP.

2.4 Comparison of the national environmental legislation and WB requirements

The following considerations reveal the main differences between the World Bank guidelines and the national legislation:

- Screening and Classification: The Bank's guidelines provide detailed description of procedures for screening, scoping and conducting ESIA and explain a complete list of stages, which are not envisaged under the national legislation.
- Considering ecological risk, cultural heritage, resettlement and other factors, the Bank classifies projects supported by them under categories A, B and C. As mentioned, in the Georgian national legislation, ESIA is carried out only if a developer seeks to implement projects listed in the Governmental Decree on the Procedure and Terms of the Environmental Impact Permit. This list is compatible with the category B projects of the Bank classification. According to the Georgian legislation ESIA is not required in other instances, while the World Bank guidelines may require limited EA or Environmental Reviews for the B category activities, as well.
- Environmental Management Plans: The Georgian legislation does not specify format of environmental management plans (EMPs) and stage of their provision for the projects subject to ESIA and do not request EMPs for the projects not requiring ESIAs. The World Bank guidelines require EMPs for Category A and B projects and provide detailed instructions on the content.
- Involuntary Resettlement: The national legislation does not take into account the

issue of involuntary resettlement at any stage of environmental permit issuance. The Georgian legislation considers social factor only with regard to life and health safety (e.g. if a project contains a risk of triggering landslide, or emission/discharge of harmful substances or any other anthropogenic impact). Thus, the national legislation does not consider resettlement as an issue in the process of issuing environmental permits, unlike the Bank which takes a comprehensive approach to this issue.

- Responsibility for the ESIA: While the Bank's document establishes the responsibility of a Borrower for conducting the environmental assessment, the national legislation provides for the responsibility of a project implementation unit to prepare the ESIA and ensure its consultation. According to the Georgian legislation the MENRP is responsible for monitoring of project implementation and compliance with the standards and commitments provided in the ESIA with a less clearly defined role in relation to EMPs. The "Project Proponent" is responsible for implementing "self-monitoring" programs for the projects subject to the ESIA. The WB guidelines stress the role of EMPs, which are important for all categories of projects and the Project Proponent is requested to ensure inclusion of monitoring schemes and plans in the EMPs. Monitoring of performance compliance against the EMPs is an important element of the WB requirements.

2.5 Institutional Framework

The GoG agencies undertaking supervisory, monitoring, project management, procurement or financial responsibilities are described below.

The RD responsibilities will include, at a minimum, accepting the feasibility study and final designs and accepting road sections after completion of rehabilitation. Maintenance also falls under the responsibility of the RD, but is sourced out to private enterprises. Maintenance includes winter maintenance, regular checks and repair of the road, including drainage facilities, bridges, guardrails, road signs etc. Garbage collection alongside the road also is among the duties of RD through contracted company.

MENRP is in charge of issuing the Environmental Impact Permit for the Project, following the examination of the ESIA and the subsequent State ecological examination. The rights of the MENRP as the competent authority are the following:

- to intermit, limit or stop any activity which has or is likely to have adverse impact on the environment, as well as unreasonable use of natural resources;
- to issue a series of licenses (for natural resources use) and permits (for environmental pollution);
- to control the execution of mitigation measures by the developer; to receive free and unrestricted information from the developer about the utilization of natural resources, monitoring systems, waste management etc. and explanations from authorities concerning the Project.

The following ministries/departments of the government play a certain role in the approval/agreement process for the Project, including but not limited to:

- Ministry of Economy and Sustainable Development;
- Agency of Protected Areas under the MENRP;
- National Environmental Agency of the MENRP;

- Department of Cultural Heritage Preservation (under the Ministry of Culture and Monument Protection);
- Department of Spatial Planning and Construction Policy of the Ministry of Economy and Sustainable Development;
- Ministry of Labor, Health and Social Affairs; and
- Ministry of Agriculture.

The Local Executive Bodies perform the main administrative functions in each district, including the local land-use issues and land allocation function.

3. PROJECT DESCRIPTION

The Present ESIA report covers Gurjaani bypass road section of approximately 15 km from Bakurtsikhe village to Chumlaki village in the Kakheti region. The existing road is part of the secondary road, Akhmeta–Telavi–Bakurtsikhe (ATB road), one of the main roads in the Kakheti region. The existing road passes through densely populated areas and the section in question carries high volumes of heavy transit traffic, resulting in a high rate of road accidents. It is intended that a bypass be created connecting the international road Tbilisi–Bakurtsikhe–Lagodekhi–Azerbaijan Border (TBL road) with the existing secondary road, avoiding the town of Gurjaani and the villages Bakurtsikhe, Kolagi, Dzirkoki, Chandari, Vejini and Chumlaki.

A design for a road bypassing these settlements was prepared in the late 1980s and partially constructed. Although the roadbed and structures are seriously degraded this alignment is clearly one of the most feasible bypass alternatives.

The route of the original 1980s bypass starts at the junction of the Tbilisi–Bakurtsikhe–Lagodekhi road and the Bakurtsikhe–Telavi–Akhmeta road and runs north-eastward from there for two kilometres. The route underpasses the existing disused railway line at Km 1.8 before turning ninety degrees to run north-westward parallel to the route of the existing road and disused railway line.

Thereafter the route runs parallel to the disused railway line to Km 8.0 where it turns away from the railway alignment to run northwards. It crosses a major streambed at Km 9.0 before turning and running north-westward for 4.5 km to a major river crossing point at Km 13.5. This section runs through three built up areas where there are significant obstructions. The first is between Km 9.1 and Km 10.1 where buildings and a communications tower obstruct the route, the second is at Km 11.5 and the third is at Km 13.1 where the route is constrained by buildings.

The original bypass route continues for 0.9 kms after the river crossing before converging with the existing Akhmeta-Telavi-Bakurtsikhe road and disused railway line, at Km 14.4.

The route traverses agricultural land except for the built-up areas noted. There is intensive vineyard cultivation on much of the agricultural land. The route is crossed by numerous minor roads running along a south-west to north-east axis, as well as several watercourses on the same axis (discharging to the north-east). Several structures were wholly or partially constructed in the 1980s to cater for these roads and streams. In general the concrete box-culvert/bridge structures have deteriorated to the extent that replacement is required, but the certain structures can be retained.

A desk study of the project area has been undertaken to ascertain whether there are any better options than the route selected for the bypass in the 1980s. A bypass on the lowland side of the valley is clearly preferable to one higher up the slope on the other side of the existing route. Any other alternative alignment on the lowland side, to the 1980s bypass route, would have a greater length (increasing both capital and operating costs) and would require land acquisition for the entire Right of Way with attendant increased costs, social disruption and adverse environmental effects (the removal of land from agricultural use). There appears to be no better option than adopting the general alignment selected in the 1980s and capitalizing on the value of the established Right of Way. This 1980s bypass Alternative 1 has a length of 14.5 km.

However a variation to the route is required at the Chumlaki end of the alignment. Considerable building development has taken place since the original bypass route was established. Also the original bypass route approaches the existing main road at an oblique angle near the existing “at level” railway crossing. These factors make it difficult and disruptive to create a satisfactory junction at this termination point. An extension to the bypass route is proposed to create an alternative termination point closer to Telavi, this bypasses the recently developed area and allows creation of a satisfactory junction. This modified bypass Alternative 2 has a length of 15.0 km.

Roundabouts are proposed for the termination points, Km 0 and Km 14.5 or 15.0. Roundabouts are also proposed at two key intersections, Km 9.6 and Km 13.15: elsewhere underpasses are proposed for the major routes intercepting the bypass alignment, to maintain local traffic patterns but without allowing intermediate access to the bypass, in order to ensure an optimal traffic flow on the bypass. Speed constraints affecting bypass traffic will occur in the section between Km 9.1 and Km 10.2 and at the intersection at Km 13.15: elsewhere traffic will flow freely.

The terrain is classified as “plain” except for the section from Km 0 to Km 1.8 which is “hilly”. Cross-sections considered were:

Georgian Standards (Type II Plain Terrain) indicate two lanes, each 3.5m wide (with 2.5% cross-fall), being 7.0m overall carriageway with 2.5m paved shoulders and 0.5m road edge on each side.

SNIP Standards (Category III) indicate two lanes, each 3.5m wide (with 2.0% cross-fall), being 7.0m overall carriageway with 0.5m paved shoulders plus 2.0m unpaved shoulder on each side.

3.1 Conceptual Design Options

3.1.1 Road Cross-Section

Two different road cross-sections were considered in the economic analysis.

One road cross-section to Georgian Standards incorporating two 3.5m traffic lanes (except between the start and Km 2 where a third, “climbing”, lane is required) providing a 7.0m carriageway, flanked on both sides by a 2.5m paved shoulder with 0.5m edge, providing a 13.0m overall width. The carriageway cross-slope was 2.5%. The embankment side slopes were 1 : 1.5.

The other road cross-section to SNIP Standards incorporating two 3.5m traffic lanes (except between the start and Km 2 where a third, “climbing”, lane is required) providing a 7.0m carriageway, flanked on both sides by a 0.5m paved shoulder with a further 2.0m unpaved shoulder beyond , providing a 12.0m overall width. The carriageway cross-slope was 2.0%. The embankment side slopes were 1 : 1.5.

The more generous Georgian Standard cross-section was deliberately chosen to provide a clear contrast with the SNIP cross-section so as to check, during the economic modelling and analysis, whether the reduced “side friction” achieved by the more generous paved shoulder width provided adequate returns in vehicle operating costs to justify the additional capital cost, estimated at 19.5%.

The economic analysis clearly shows that there is insufficient reduction in Road User Costs to offset the higher construction cost of the Georgian standard cross-section.

It is therefore proposed that the SNIP cross-section described above be adopted for the conceptual design.

3.1.2 Pavement Design

The pavement design is incorporated as an Annex to the technical report. The Annex covers:

- General Design Principles
- Traffic
- Pavement Loading Derivation
- Recommended Pavement Loading Assumption
- Sub-Grade Support
- Environment
- Pavement Structure
- Summary
- Conclusion

The Conclusion was that three separate pavement designs (selected from the eight developed) should be used for the economic analysis.

The three designs selected on the basis of cost efficiency were Design #6 for a flexible pavement, Design #7 for a pavement incorporating a cement/bitumen stabilized base course and Design #5 for a rigid pavement of unreinforced concrete.

The costing presented in Section 6 indicates that Design #7 for the stabilized alternative would be the most economical and the economic analysis modelling confirms that.

It is accordingly recommended that the pavement adopted for conceptual design should be of the following composition:

- Fine grained dense asphalt-concrete hot mix type B, class II, Thickness 5.0 cm
- Coarse grained porous asphalt-concrete hot mix class II, Thickness 7.0 cm
- Crushed stone (0-40 mm), stabilized with 3.5% cement and 2.5% bitumen, Thickness 18.0 cm
- Sand gravel mix, Thickness 22.0 cm

3.1.3 Junctions

It is suggested that access to the bypass be restricted to permit smooth passage of through traffic using the bypass. It will also be necessary to ensure that illegal access to the bypass is prevented in the future to ensure that the economic benefits of the investment are secured.

The underpass structures detailed above are intended to ensure that there is minimal disruption to local agricultural traffic movement.

Roundabout structures are proposed at the beginning and end of the bypass. Along the length of the bypass it is proposed that two at grade junctions be provided: at Km 9.6 on the Gurjaani-Kabali road and at Km 13.15 on the Chumlaki-Kitaani road.

3.2 River crossings

The road alignment is crossed by 16 relatively large rivers and 6 smaller streams.

The most important of the rivers are the Chalaubnis Khevi, the Vejinis Khevi, the Dzirkokis Khevi, the Akhtalis Khevi and the Papris Khevi. All the watercourses start on the north-eastern slope of the Tsiv-Gombori Range at an altitude of 800-1000m above sea level and join the Alazani River on the north-east side of the alignment.

3.3 Quarry and Borrow pits sites

During construction of the road, locations of quarry and borrow sites, access roads, spoils disposal sites for wastes and other facilities will be determined by contractors. Project will not implement any exploration activities from illegal sources.

Borrow pits location will be proposed by the engineering team at the final design stage. The exploration of the borrow pits and quarries will be conducted by the licensed companies or the Constructing Contractor will obtain its own licenses. There will be potential impact of quarrying activities at various locations including river bed and floodplain locations. So, necessary environmental permits of suppliers from relevant authority will be obtained by the contractors if used any illegal source.

The following quarries are selected for the supply of aggregate used in road construction during detail design.

Table 3-3: Potential Borrow Pit Sites adjacent to the construction site

License No	Resources	Region	Company
No 00687	Sand-Gravel	Gurjaani, Kakheti	P. p. Ivane Makharashvili
No. 01156	Sand-Gravel	Gurjaani, Kakheti	LLC Kvirike
No. 00771	Sand-Gravel	Gurjaani, Kakheti	LLC Kvirike
No. 00771	Sand-Gravel	Gurjaani, Kakheti	LLC Kvirike

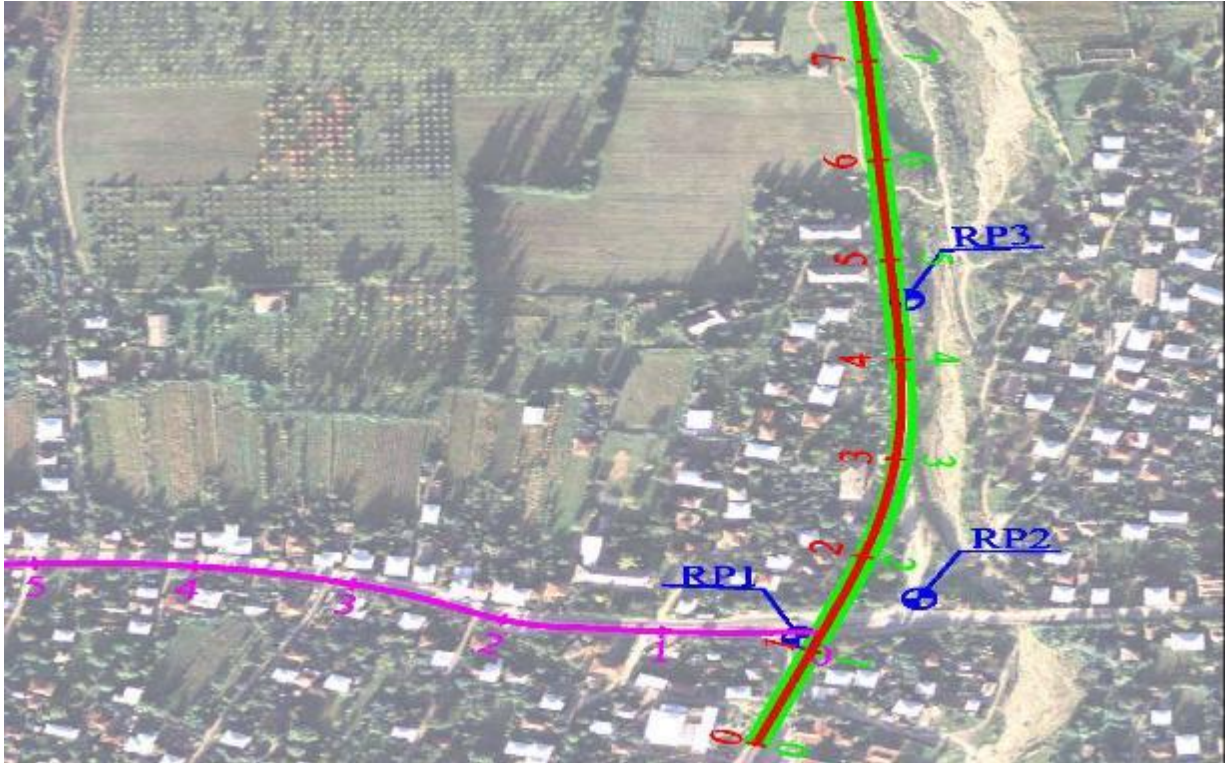
During construction, Contractor must verify if the material from the existing borrows is acceptable for the construction purposes. At the same time Construction contractor may decide to obtain the license by his own.

3.4 Construction Camps

Camp sites will be selected keeping in view the availability of an adequate area for establishing camp sites, including parking areas for machinery, stores and workshops, access to communication and local markets, and an appropriate distance from sensitive areas in the vicinity. Final locations will be selected by the contractor after the approval from Engineer and RD. Land for the construction camps are usually leased from Local Authorities or on voluntary basis from land owners and no expropriation for this purpose is possible.

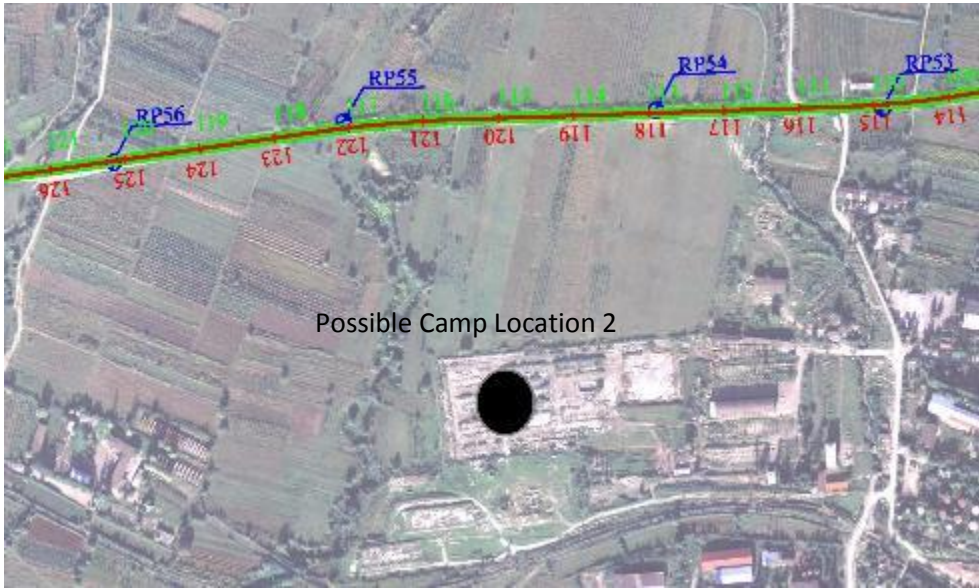
For the detailed design 2 possible options of camp site are proposed:

First is located at PK 5 (Bakurtsikhe village), as it is proposed two apartment buildings are falling under resettlement and to be removed during or after construction. After RAP implementation and before removal of these buildings they could be used as a camp for contractor.



Camp location 1

Another possible site is located at Pk 120 former Railway warehouse.



Camp location 2

The area requirement for construction camps will depend upon the workforce deployed and the type and quantity of machinery mobilized. In view of the area required, it will not be possible to locate camp sites within the ROW and the contractors will have to lease land from private landowners on voluntary basis (no expropriation is possible).

The construction camp will have facilities for site offices, workshop and storage yard, and other related facilities including fuel storage. The site selection for the construction camp is not yet finalized.

The contractor will provide the following basic facilities in the construction camps.

- Adequate ventilation facilities
- Safe and reliable water supply.
- Hygienic sanitary facilities and sewerage system.
- Treatment facilities for sewerage of toilet and domestic wastes.
- Storm water drainage facilities.
- Sick bay and first aid facilities.
- Compliance with fire and safety codes

At present there have not been yet chosen the location for the construction camp or the routes of the temporary access roads, which will be defined by the contractor.

4. METHODOLOGY

The ESIA work consisted of the six main activities that are common to most ESIA studies conducted to international standards. These comprise:

- Collection of baseline data describing the existing environment (physical, biological and human) within the area of the proposed project impact. Desktop studies and field surveys conducted to address important gaps in the existing data, up to date information on topics and areas where significant negative impacts are expected - collected.
- Identification of impacts, assessment of their significance and development of mitigation measures (avoidance of impacts is preferred over mitigation by both Bank safeguards and Roads Department policy.)
- Analysis of alternatives in terms of location, technology, design and operation, including the "zero alternative".
- Development of EMP according to World Bank OP 4.01 Annex C.
- Stakeholder consultation and disclosure (conducted according to national law and the World Bank policy).
- Development of the ESIA report.

4.1 Botanical and Faunistic Surveys

This project consisted of a review of literature including both primary sources and government and consultant reports. Botanical and faunistic surveys have been carried out. Field works were performed by biodiversity team on 17th October 2014 and by waste management team on September 10th and 11 of 2014. Social survey on February 23, 2015.

An evaluation of botanical resources was conducted to determine if any regional red-listed special-status plants or their habitat occurs along the transect. Special-status species are those listed under the Georgian law "On" Red Book" and "Red list" of Georgia (Georgian legislative bulletin N19 1.07 2013).

Sit set-up method was starting with the old bridge ending up with Kotekhiskhevi river, which was explored by the researchers. The botanical recording took place along the road and road sides within maximum of 4-5 meters. Considering the fact that vast majority of the roadside is covered by cultivated land and croplands not much of the flora territory was recorded. In addition to that, there is a channel on the left side of the road from Bakurtsikhe to Gurjaani direction. That is why the lack of flora territories are identified.

Faunistic field survey was organized with the purpose of verifying the data obtained from the literature on the animal species composition and areas of their occurrence. A simple methodology of surveying animal footprints, droppings and dwellings was applied to collect information on key species of mammals and birds.

4.2 Waste

Prior to commencement of the works on Gurjaani-Bakurtsikhe road, its corridor must be cleaned off the dumped waste, which is to be collected, transported and disposed on the nearest landfill. Towards this end, the the amount and content of the waste was identified and a waste management plan was developed.

4.3 Pollution (Soil, Air)

Geotechnical, hydrological and hydrogeological conditions, soils composition and properties of the soil have been studied by *GeoEgineering Ltd.*, under the contract with *Roughton Internationl Ltd.*

According to the WB policy, the air pollution impact assessment should be performed relying on guidelines and standards of both the WB and of the borrowing country; in cases they differ, the stricter ones should be applied. Maximum allowable pollutant concentrations according to the Georgian regulations (*Georgian Ministry of Labor, Health Care and Social Welfare (2003) Order 38/n "On approval of qualitative environmental standards: Accept- able limit concentrations of pollutants in atmospheric air of residential areas"*) and the WB recommendations (*EHS guidelines, "Air Emissions and Ambient Air Quality"*, based on WHO guidelines) are given below. 30 min onetime maximum concentration under the Georgian standard is assumed to be the strictest and therefore applicable in the evaluation.

It is assumed that if modeled under the worst possible meteorological conditions, 30 min onetime maximum pollutant concentrations will not exceed limit concentrations given below; exceedances of limit concentrations indicated by longer time periods are not likely to occur neither.

4.4.1 Air

Air pollution control from vehicular sources falls under the responsibility of the MoE. Regarding traffic emissions, the relevant standards that are currently in force in Georgia, date back to the Soviet period and cover soot, carbon-monoxide, nitrogen oxides, sulphur dioxide and hydrocarbon. However, according to the MoE, their enforcement does not take place in practice and there is no national policy or strategy to gradually reduce traffic emissions. 'Texosmotr' (a technical check) will however be required for heavy-duty vehicles (which includes lorries used during construction).

Maximum Allowable Concentrations (MAC) according to the Georgian standards and WHO guidelines

		EHS Guidelines*	Georgian standard
CO	1 hour	30 mg/m ³ (25 ppm)	-
	8 hour daily maximum	10 mg/m ³ (10 ppm)	-
	30 min onetime maximum	-	5 mg/m ³
	24 hour	-	3 mg/m ³
NO2	1 hour	200 µg/m ³ (0.11 ppm)	-

	<i>Annual</i>	40 µg/m ³ (0.026 ppm)	-
	<i>30 min onetime maximum</i>	-	85 µg/m ³
	<i>24 hour</i>	-	40 µg/m ³
PM10	<i>24 hour</i>	50 µg/m ³	300 µg/m ³
	<i>Annual</i>	20 µg/m ³	-
	<i>30 min onetime</i>	-	500 µg/m ³

4.4.2 Noise

The current Georgian standards for the noise level are based on former soviet sanitary norms No. 3077-84 and specify different noise levels for different zones. The most relevant standards are the noise limits inside the residential building and outside it (at the wall) which are as follows:

Inside the residential buildings:

For Leq (7a.m. - 11p.m.) the indicative (equivalent) sound = 40dB (A), maximum level = 55dB (A)

For Leq (11p.m. - 7a.m.) the indicative (equivalent) sound = 30dB (A), maximum level = 45dB (A)

Outside the residential buildings (measured at the wall):

For Leq (7a.m. - 11p.m.) the indicative (equivalent) sound = 55dB (A), maximum level = 70dB (A)

For Leq (11p.m. - 7a.m.) the indicative (equivalent) sound = 45dB (A), maximum level = 60dB (A)

International Regulations

Federal Highway Administration: Exterior Noise Abatement Criteria

Activity Category	Maximum 1 hour Leq
Land where serenity and quiet are of extraordinary importance	57 dBA
Schools, churches, libraries, hospitals, residences, playgrounds, recreation areas	67 dBA (52dBA indoors)
Developed lands	72 dBa

Modeling of Traffic Related Noise

Point-source propagation can be defined as follows: $\text{Sound level}_1 - \text{Sound level}_2 = 20 \log r_2/r_1$. This means that for every doubling of distance, the sound level decreases by 6dBA ("inverse square law"). Line-source propagation occurs when there is a continuous stream of noise sources. The reinforcement by the line of point sources makes the propagation field either cylinder shaped or a half-cylinder shaped area. The line source propagation prediction model is as follows: $\text{Sound level}_1 - \text{Sound level}_2 = 10 \log r_2/r_1$; the decrease in sound level for each doubling of distance from a line

source is 3 dBA. When noise levels from a busy road are considered, it is appropriate to utilize the road as an infinite line source and consider a 3-dBA doubling of the distance-propagation rate.

In order to carry out semi-quantitative estimation of noise impacts related to existing and projected traffic, we used measured noise data – average and maximum values provided in the Table 4.5.1. Based on comparison of the maximum and average levels of noise and existing traffic volume data, we can consider that current traffic is not high enough to apply linear source of propagation (3-dBA law) but the attenuation figures are between the point source and linear source (between 3-dBA and 6-dBA values). Increase of the traffic volume will lead to reduction of intervals between the vehicles crossing the given cross-section of the highway. Therefore, we assumed that according to the traffic volumes projected for the 2030, the traffic will be “dense enough” to apply 3-dBA law for the noise attenuation and maximum of currently observed average figures (68 dB A) could be taken as indicative figure for noise at a 5m distance from the road side.

4.5 Methodology for Analysis (Ranking) of Alternatives

The principles for Analysis of alternatives are as follows:

- a) Comprehensive consideration of technical, technological, ecological, social and economic parameters of the project solutions of the planned activity;
- b) Variance of project solutions to ensure compliance with the environmental standards and consideration of alternative versions;
- c) Comprehensive consideration of regional and local factors.

5. BIOPHYSICAL AND SOCIAL ENVIRONMENT

5.1 Landscape

Landscape of Gurjaani municipality is mostly low mountainous, in some places – middle mountainous. Elevation varies from 300-450 meters to 850-1000 meters. The municipality is located in river Alazan basin. In the central part is Gombori half-low mountainous ridge. Gombori ridge here starts from Sagarejo municipality. It consists of Cretaceous and Neogene clays, masonry stones, limestones, conglomerates and tephrogenic sedimentary suites. Gombori ridge gradually decreases outside Gurjaani Municipality, turns into hillock and joins Lori highland.

From the east of Gurjaani municipality, there is Alazani intermountain plain. Within the municipality, the length of Alazani plain is approximately 32 km, width – 12-14 km, height of 380 m to 450 m. It consists of quaternary clays and sands. Formation of the plain started from neogene. Submergence continues in existing era too. Alazani plain has a perfect flatness, only some little tall hills are here and there, which complicate the view of the flat surface.

The project ROW is located on Alazani plain and mainly passes through agricultural landscape, only near Gurjaani it goes close to industrial facilities.

5.2 Climate

Territory of the municipality covers central part of Alazani Valley and low and medium mountain zone of Tsivi - Gombori Ridge, due to which it is not distinguished with diversity of climate zones. Gurjaani meteorological station is the source of data to describe the territory. It is located at 415 m above the sea level. In city of Gurjaani the climate is temperate humid, with hot summer and moderately cold winter, with double maxima of precipitation in a year. Average annual temperature of this territory was +12.4 °C, average of the coldest month (January) was 0.9 °C, and the hottest month (August) +23.6 °C, absolute minimum -22 °C, and absolute maximum +38 °C. The total of active temperatures (above +10 °C) was 3 924 °C. Average annual relative humidity of the air compiled 72%. Annual total of precipitation was 741mm, monthly total maximum of which as a rule fell in May and made 117mm, and minimum – in January (28 mm). Average annual wind speed was 1.7 m/sec. Western and South - Western winds were prevailing on surrounding area.

Temperature. The analyses of climate elements changes in two periods between 1961-1985 and 1986- 2014 demonstrated that in Gurjaani municipality annual temperature has increased by 0.4 °C, and compared with 1925-1960 - by 0.7 °C. Warming is ongoing in all seasons, except spring, it is highest in summer (+0.6 °C), and in spring seasonal temperature has not changed. Revealed warming is sustainable and confirmed by the trends in summer and spring, as well as by the annual value. In 1961-2014 the rate of change of average annual temperature made 0.14 °C /10 years. Annual absolute maximum of temperature has increased in all seasons between the periods, with highest value in autumn (+2.1 °C). Absolute minima are significantly warmer in winter and summer (+3 °C). Average maximum of temperature between two examined periods has increased significantly (+0.5 °C), while annual value of average minimum was increased insignificantly (+0.1 °C). Annual daily amplitude of temperature has increased in all seasons up to 0.5 °C.

Precipitation – Total precipitation has decreased between two mentioned periods by 18mm or 2% and compared with the level existing in the period between 1925 and 1960 has increased by 4%. As for maxima of daily precipitation, their absolute values were increased by 6-24 mm for all seasons, except summer, in which the decrease by 54 mm took place.

Relative humidity of air in fact has not changed between the periods and remained within the range of 72%.

Average wind speed was reduced equally in all seasons between two periods by 0.3-0.4 m/sec.

Winter on the territory of Gurjaani municipality became relatively milder. Almost all temperature parameters are increased (warmer) by 0.3-0.4 °C, except average minimum, due to which freezing nights are more frequent and the risk of frost in winter is maintained. Seasonal totals of precipitation have increased by 9%. In spring picture of temperature alteration is different. On the background of constant average temperature between the periods, small increase of maxima (+0.2 °C) is compensated by cooler minima (-0.3 °C). Average daily amplitude of temperature has increased by 0.5 °C, due to which the threat of frosts is still maintained. Insignificant increase of precipitation (+3%) is followed by the reduction of average wind speed. Summer is the warmest compared with other seasons (+0.6°C). Both maxima (+0.8 °C) and minima (+0.4 °C) have increased. Seasonal totals of precipitation are reduced significantly (average 20%). In summer one month agricultural moderate as well as severe and extreme draughts have increased. Recurrence of heat waves has also increased. Thus, summer in Gurjaani became considerably hotter and relatively drier. Autumn, similar to summer, became warmer, however relatively less (+0.4 °C). Absolute maximum is increased by +2.1 °C and absolute minimum is reduced by 0.4 °C. Seasonal totals of precipitation on the average have increased by 11%, which could be resulted by increase of the risk of flash floods and mudflows in this season.

Thus, between the two reviewed periods in Gurjaani municipality temperature has increased most of all in summer (+0.6 °C) and the least – in spring (+0.0 °C). Precipitation has significantly reduced in summer (-20%), while noticeably increased in autumn (+11%).

Duration of vegetation period for the threshold temperature 12 °C has increased by 3 days, between the reviewed periods and its average temperature has increased by 0.4 °C. Consequently sums of active temperatures have increased as well. In vegetation period totals of precipitation on the average have reduced by 31 mm. Duration of frostless period between two examined periods in average was reduced by 7 days. The period of temperatures optimal for bee keeping (16-25 °C) was also reduced by 7 days, at the background of actually unchangeable relative humidity (average 68%).

As for extreme events, the increase of recurrence of one month agricultural draughts was identified; however the frequency of draughts for longer periods (3 – 6 months) was reduced.

5.3 Hydrology

Akhtala Gully flows in the middle of Gurjaani city. Akhtala river levels increase in the spring, during abundant precipitation and snow melt and decrease in the winter. City of Gurjaani is separated in two by Alazani canal. Hydrographic network of the municipality is not so dense. The territory is mostly segmented by dense network of valley-rivers. The most part is anhydrous dry. The main river artery is river Alazani with short tributaries. The main tributaries within the municipality are: Tchermiskhevi, with Papriskhevi as a tributary, Shromiskhevi, Chalaubniskhevi, Tsiliana, Mgvrie Khevi from where the most physiographic importance has river Chermiskhevi, which starts at the middle mountainous zone of Gombori ridge 1118 m from the sea level. Before entering Cherami village the river has south-eastern direction and after the flow is quite changeable. The small part even branches in Alazani valley. Total length of Tchermiskhevi is 35 km and basin area is 155 km². It is fed by snow, rain and groundwater. The average annual flow is 1.8 m / sec.

The main tributary of Tchermiskhevi is river Fafriskhevi (length 22 km), which starts at the low mountainous zone of Gombory valley.

River Lakbe is also important in Gurjaani municipality, which is the left tributary of river Iori. Lakbe starts at Gombori valley. Length – 32 km. It is fed by snow, rain and groundwater. It is characterized by spring floods. Main tributaries are: Kartakhevi, Jimitistskali (right side), Mkrali Ole (left side).

The road alignment is crossed by 16 relatively large rivers and 6 smaller streams.

The most important of the rivers are the Chalaubnis Khevi, the Vejinis Khevi, the Dzirkokis Khevi, the Akhtalis Khevi and the Papris Khevi. All the watercourses start on the north-eastern slope of the Tsiv-Gombori Range at an altitude of 800-1000m above sea level and join the Alazani River on the north-east side of the alignment.

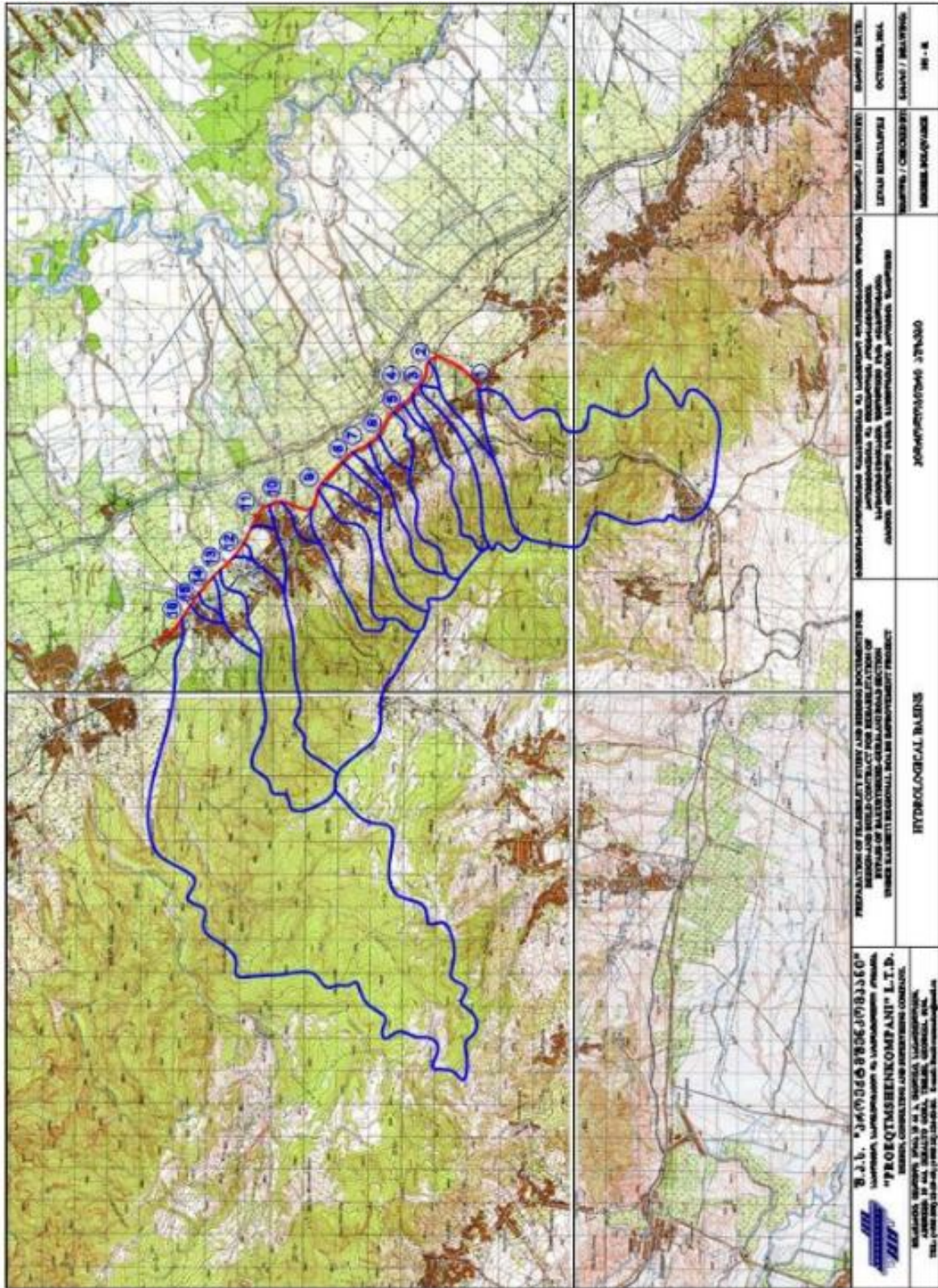
The river basins are clearly divided into mountain and plain zones. The river gorges in the mountain zone are deeply cut into the relief and characterized by a dissected surface. The representative geology of this area is ancient conglomerates, marl stones, sandstones and limestones. The river basins plain zone is located in the Alazani River valley where the gorges are not clearly defined. The geology of the plain zone is composed of relatively new alluvial deposits.

The representative soils of the mountain zone are clayey brown soils. Deciduous forests occupy a large part of the mountain zone, while agricultural crops grow on the plain zone.

The areas of the river catchment basins vary from 0.25 km² (Gorge No 12¹) to 54 km² (Papris Khevi). The catchment lengths range from 1km to 18 km. The catchment slopes are a minimum of 0.033% (Papriskhevi) and a maximum of 0.782% (Gorge No6). The characteristics of the rivers and streams are given in the table below. A hydrological map showing the catchment areas is included overleaf.

The flow regime of the watercourses is characterized by high water flow in the spring caused by rain and flash floods in the autumn. The water discharges in the autumn are higher than those in the spring. Normal water flow in the rivers and streams is confined to the mountain zone, while in the plain zone rivers and gorges are dry except in times of spring high water and autumn flash floods. It is to be noted that in some high water flow years the rivers transport a large quantity of sediment.

Map 5.3 Hydrological map



5.4 Geomorphology and Soils

In terms of geomorphology, the surrounding territory of the project area belongs to Alazani Depression western part of the Intermountain plain zone of Georgia. Alazani Depression is a current continental geosyncline, which is located between Major Caucasus range on the east and the Gombori range on the west. Direction of the Alazani Depression is NW - SE and it is filled with Quaternary alluvial-proluvial deposits of the rivers flowing from the Caucasus and Gombori slopes of the same direction. Scientists think that the Alazani Depression was formed by submergence of the Caucasus south periphery.

The Alazani valley bottom, filled with Quaternary alluvial-proluvial deposits, at first looks totally plained and homogenous, but its surface is undulating, with height difference between elevations by 200-300m. These undulations are due to existing thick debris cones of the rivers. The cones are developed on both sides of the river Alazani, while the river itself flows along longitudinal geometric axis of the Depression.

Along the Alazani valley, existence of various-level alluvial terraces is observed on different sites. On the right bank, at about 140-150 m height from the Alazani river level, morphologically well expressed terrace steps are observed at the territories of Telavi, Tsinandali, Akhasheni, Gurjaani, Bakurtsikhe and Tibaani. These terrace fragments, having survived from denudation of the north slope of the Gombori range, are covered with deluvial deposits and proluvial sandy clayey and rounded cobbly deposits drawn out by the rivers flowing down the slopes. At some places, under the deluvial- proluvial deposits, sometimes alluvial deposits of the Alazani are exposed.

The project road is located in the transitional line between the Gombori range north-western slope and the Alazani plain, which is a south-eastward (i. e. directed toward the Alazani) gentle slope. The road deployment line from vil. Chumlaki to vil. Bakurtsikhe perpendicularly intersects with several lateral gullies flowing down the northern slope of the Gombori. Among them are the rivers: Mukhlianiskhevi, Kotekhisikhevi, Vedzirula, Akhtaliskhevi, Jandariskhevi, Dzirkokiskhevi, Vejiniskhevi, Bakurtsikhiskhevi, Chalaubniskhevi. The gullies are deeply cut in the Gombori range with V-shaped cross profiles, big inclinations of the channels and steep slopes, while after coming out of the steep Gombori slopes, channels depth and inclination of the lengthwise sections decreases. On the area of their intersection with the project road, the depth of the channels is so small that in many of them mudflows (very typical of almost all the gullies) come out at the banks. Along the sides of the gullies, mudflow debris cones are developed, due to which the western slope of the Alazani Depression and the relief of the road deployment line are undulating, with smoothed surface and shallow channelling.

Geological Structure and Seismicity

In terms of geological structure, the road alignment is laying in two different parts (see Annex- 1, General Geological Map of the Area), where one part is structured by main marine and marine-continental deposits, whereas the second part represents the Quarternary deposits resulting from the weathering and denudation of the first part deposits.

The bottom of the north-eastern slope of the Gombori Range is formed by Neogene, Paleogene and Cretaceous deposits. Deposits of different age are represented by the following rock varieties:

- **Neogene** (Aghchagil and Apsheron stages - N₂³ak+ap) – Continental and marine molasses - conglomerates, sandstones, clays;
- **Paleogene** (Upper Eocene and Oligocene - P³-P₃) – clays, sandstones, argillites;

Soils

Forest brown soils can be found on alluvial fans and Gombori ridge slopes. On upper areas can be found other forest brown soils of medium and small thickness. Outside upland of Kakheti there can be found black soils of medium and small thickness and on Alazani valley - calcareous alluvial soils. Here are alluvial carbonaceous soils, which are formed on the alluvium taken from Gombori ridge by Alazani tributaries.

Based on the field studies and laboratory analyses, Bakurtsikhe-Gurjaani-Chumlaki bypass motor road deployment line lithology is made up of Quaternary system (Q) alluvial-proluvial and proluvial-deluvial deposits, overcovered on certain segments of the road by technogenous soils (road fills and loose soil). In the lithology of the road alignment, altogether 10 varieties or engineering-geological elements (EGEs) are distinguished.

5.5 Pollution

The road corridor was cleared and small some construction works was undertaken (ROW clearance and artificial structures) in the late 80's. The project area was abandoned for more than 20 years and it was considered by locals as now ones land, ease access caused appearance of spontaneous dumping places. The total amount of solid waste along the ROW is estimated as 50-60 m³. About 10-15% of the waste is asbestos sheeting; approximately 5% is plastic bottles and other plastic remaining; 10%-15% is remaining from the household repairs, 5% old tires, biggest part of the illegally dumped waste is household non-hazardous waste.

Waste content

Aiming at identifying the amount and content of the waste, a trip to the project zone was organized on September 10 and 11 of 2014. As already mentioned, as per the preliminary information, the primary source of the waste origination is the materials of the damaged buildings and premises during the flood. As the local population stated, the facts of throwing the construction and municipal waste into the existing waste are frequent.

As the visual observation evidenced, the waste in the given area is construction and municipal one. No organic waste is found in the area. This can be explained by the cattle of the nearby villages using the project zone as a drive and eating any organic remains found in the area (Figures 1 and 2).

Figures 1 and 2: Driving the cattle across the project zone



An evidence of the sellable waste presumably chosen (separated) out of the total waste volume by the locals was clearly seen in the project zone (Figures 3 and 4).

Figures 3 and 4: Plastic and glass bottles placed separately



Most of the waste in the said area belongs to a non-hazardous type of waste. However, even visually it can be seen that 10-15% of the total waste in the area (approximately 5-6 m³) is asbestos-containing waste, in particular, asbestos sheeting. This type of waste belongs to the highly hazardous waste.

It should also be noted that the asbestos-containing waste was allocated as a small fill (Figures 5 and 6), as well as asbestos-containing fractures of the sheeting mixed with different kinds of waste (Figures 7 and 8).

Figures 5 and 6: Asbestos-containing waste placed as a separate pile



Figures 7 and 8: Small asbestos-containing waste mixed with different kinds of waste



During preparation of the report meeting with the “Solid Waste Management Company of Georgia” Ltd took place. Authorized person informed that Gurjaani landfill is closed and will be reopened by the end of the year, at the same time landfills at Telavi and Lagodekhi are able to receive existing and generated wastes right now.

5.6 Flora and Fauna

5.6.1 Flora

Vegetative cover: Alazani plain is almost fully used. The primary vegetation is preserved only on Alazani riverbank areas as fragments of riparian forest. Forest-steppe vegetation can be found on non- sown land, where shrubs and forest vegetation switch each other. Territory in front of Gombori ridge is covered by Thorn, hornbeam, hawthorn, dog rose, buckthorn and more.

Botanical survey for the Gurjaani-Bakurtsikhe road section located in city Gurjaani district, Kakheti Region, was conducted in 17th October 2014. The entire project site is approximately 15kms. The

botanical survey was conducted along an old road which was designed before the break-up of the Soviet Union, and was stopped because of financial constraints.

The bypass provides suitable habitat for walnut tree (*Juglans regia L.*) which is represented to be a species of the **Red book** of Georgia, also as mentioned above this road was constructed during the Soviet Union, since then it was being used by local farmers for reaching their cropland that is why several invasive species have spread and now occur with a high density.

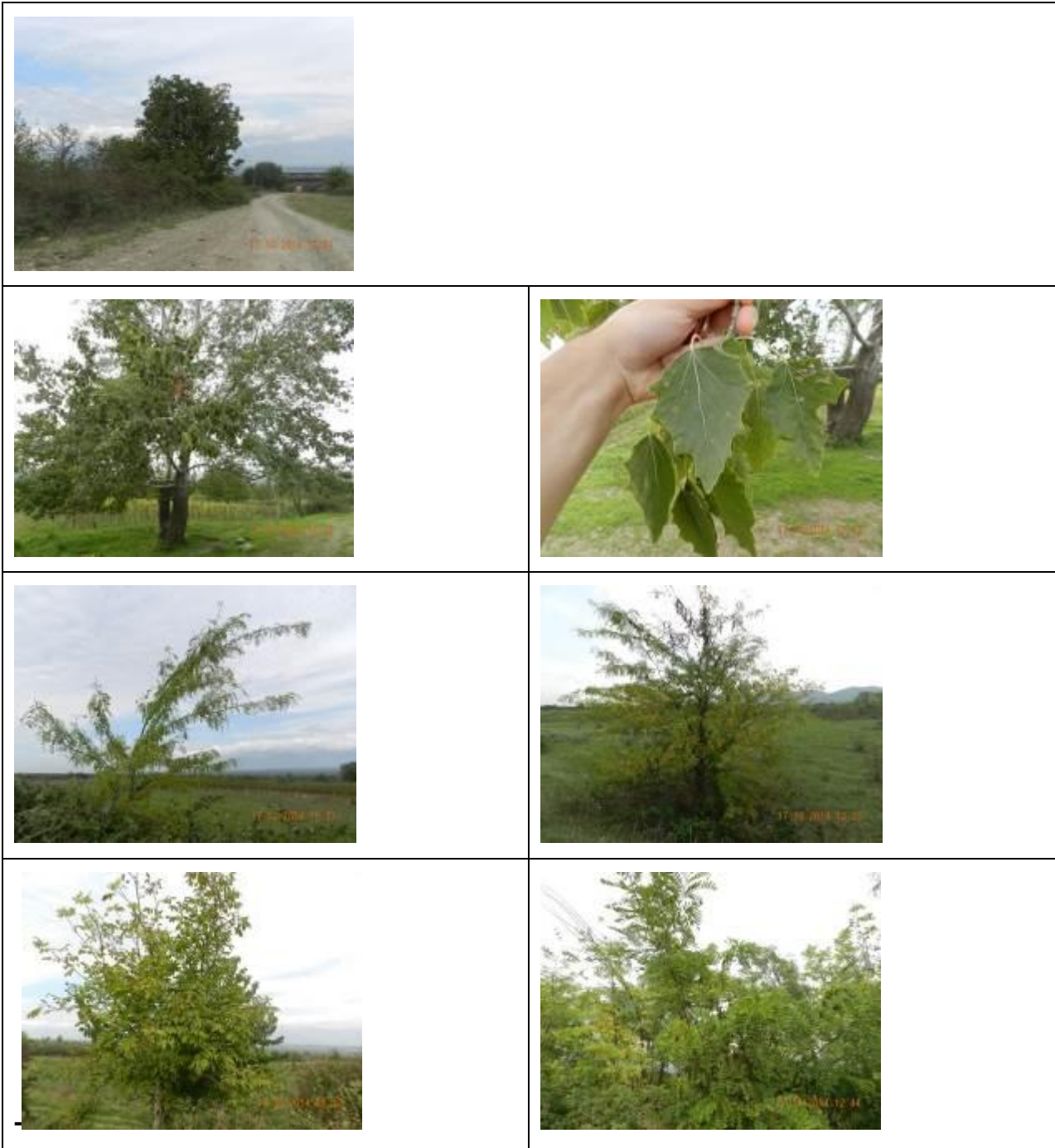
Due to the fact that the transect is far long utilized for travel purposes by the local villagers and farmers for agricultural means, two invasive species were identified during the research. *Ailanthus altissima* and *Robinia pseudoacacia*.

Also, vast majority of the site is occurred by shrubs like *Rubus sp.* and *Rosa sp.*

There are some endemic tree species on the site.

Plant species observed are presented below:

Photos taken of road alignment





5.6.1 List of Plant Species

FAMILY	Species	Elevation	Amount	Status	IUCN Status
Trees					
Simaroubaceae	<i>Ailanthus altissima</i>	330m	20-30	X	X
Fabaceae	<i>Robinia pseudoacacia</i>	341m	40-50	X	X
Fagaceae	<i>Quercus iberica</i>	364m	1 Individual	X	X
Salicaceae	<i>Populus alba</i>	329m	3 Individuals	X	X
Juglandaceae	<i>Juglans regia</i> L.(walnut)	338m	~20	<u>Georgian Red Data List species</u>	<u>NT</u>
Tamaricaceae	<i>Tamarix sp.</i>	342m	8 Individuals	X	X
Shrubs					
Rosaceae	<i>Rosa sp.</i>	321m	>50	X	X
Rosaceae	<i>Rubus sp.</i>	330m	>200	X	X

It must be mentioned that walnuts (*Juglans regia* L.) observed during the survey are located in vicinity of the ROW and for this stage of the project they are not under the threat.

5.6.2 Fauna

In project area wild animals there can be found wolves, foxes, jackals, wild cats, rabbits, European hedgehog, Caucasian mole, badger, raccoon, otter and other. From rodents - normal mouse, vole, gray rat. There are a lot of plain birds.

Field expedition was carried out to detect existence of animals on the territory of project road. As mentioned above, the territory lays on agricultural land. There is lack of vegetation, therefore no animal diversity was found there. Also no facts of large mammals were found. According to population, sometimes there can be found badger (*Meles Meeus*). Also recently were increased predatory animals - wolves and jackals. However, facts of their existence have not been recorded. Birds' nests have not been reported. Flying hawk has been detected (*Accipiter gentiles*). There was

detected quail (*Coturnix coturnix*), sparrows (*Passer montanus*), and gray flourishes (*Carvus carone*) teams. No reptiles were found, but according to population there may be found common grass snake (*Nartix natrix*). Also there was not found amphibians, except some common frog. No species protected by Georgian Red Data List were recorded.

It should be mentioned that the road crosses several dry small canyons, where are no fish because of no water. Only one species of frog has been detected.

In river Papriskhevi may be found only *Barbus mursa* and *Barbus capito*

5.7 Cultural Heritage

On the municipality area can still find a lot of historical monuments. One of the most important is Georgian monument of VIII-IX centuries, Gurjaani Kvelatsminda constructed with cobblestones. The monastery is located 3.2 km away from the project area and no impact is expected during contraction and operation stages.



Gurjaani Kvelatsminda

There is a castle near Vejini village, which is constructed with cobblestones. There are several church inside the castle, from where the most notable are Easter Ascension and St. Mariam churches.

St. Saba Church of XIII century is preserved in Krdanakhi village, which is strongly damaged. Georgian architectural monument Tsverdabali is located near Tcheremi. Here is also urban archaeology.

Other historical monuments are: Vazisubani Basilica, Sanagre monastery and etc. During the site investigation no visual archaeological monument has been observed, Archaeological chance finding procedure is provided in annex 2.

5.8 Settlements

According to stakeholders, the study area contains some of most productive agricultural land in Georgia (Gergili, 2015). Agriculture is the basis of the economy. The main produce is grapes, fruit, and cattle breeding (predominantly cattle and sheep).

Irrigation is widely used. Technical maintenance status of the system is poor.

Settlements range in size and economic importance from Gurjaani city to small rural villages. Gurjaani has a population of ~10,000 and is an important administrative and economic center.

Most dwellings and businesses including filling stations, cafes/restaurants and roadside vendors can be found on both sides of the existing road.

The main source of income of the rural residents is agriculture related (70%), labor and businesses account for about 30%. Around 16.91% of residents' income is from pensions and social assistance payments. In the town of Gurjaani wage labor and business (about 80%) dominate with pensions/social assistance at the level of 23.8%.

Average monthly income varied from 100 GEL to around 1000 GEL.

Public health services in the region are provided by hospital, dispensaries, and ambulances. Along with the public health establishments, private medical clinics also exist.

Reconstruction of Gurjaani-Bakurtsikhe bypass road is expected to require the acquisition of 43 hectares of land affecting 350 household 7 buildings, including 4 residential buildings (households) and 3 commercial buildings.

Road construction is planned in Kakheti region, in particular, in Gurjaani Municipality. Therefore below is given information on settlements of Gurjaani Municipality which are likely to be affected by works on Gurjaani-bakurtsikhe road.

The planned activities cover the following territories of Gurjaani city and villages: Bakurtsikhe, Kolagi, Dzirkoki, Vejini, Tchandari, Gurjaani and Chumlaki. Information on these villages are shown below:

Bakurtsikhe (0 km from bypass alignment) is located at an altitude of 440 meters. It is almost 8 kilometers away from Gurjaani city. According to the information provide by local authorities 3400 people live in the village, 120 of them are IDP's. Houses in the village are mainly 2 floors and are built in 1960-80's. Public health service is provided by dispensary. One kindergarten and one school are functioning in the village. Access roads condition is acceptable. Centralized water supply exists in the village, but water supply is scheduled. Population is using spring and water wells as additional water source. No direct adverse impact. An indirect impact is expected loss of small roadside businesses. Reduction of transit movement will mostly impact roadside fruit and vegetable vendors seasonably from summer to autumn.

Kolagi village (1.5 km from bypass alignment) is located on the north-eastern slope of Gombori ridge, at an altitude of 440 meters. It is 7 kilometers away from the city of Gurjaani. According to the information provided by local authorities 1380 people live in the village, 2 of them are IDP's, 10 are Persons with disabilities and other vulnerable persons, 103 retired persons. Houses in the village are mainly 2 floors and are built in 1970-80's. Public health service is provided by dispensary. One kindergarten and one school are functioning in the village. Access roads condition is acceptable, in some places drainage ditches are needed. Centralized water supply exists in the village, but in summer water supply is scheduled. Population is using spring and water wells as additional water source. Power supply is being provided for 24 hours. No direct adverse impact. Indirect impact is the expected loss of roadside businesses. Reduction of transit movement will mostly impact roadside fruit and vegetable vendors seasonably from summer to autumn. **Dzirkoki village** (1 km from project alignment) is located on the north-east slope of Gombori ridge, at 450 m from sea level. It is 4 km away from Gurjaani. According to the information provide by local authorities 1500 people live in the village, 15 of them are Persons with disabilities, 270 retired persons. Houses in the village are mainly 2 floors and are built in 1970-80's. No Public health service is provided; people have to travel to Gurjaani city. Kindergarten and school are located 1 km away from the village. Access roads condition is acceptable; roads in the village are in a bad condition. Centralized water supply exists in the village, but in summer water supply is scheduled

40 minutes once in 2 days. Population is using spring and water wells as additional water source. Power supply is being provided for 24 hours. No direct adverse impact. An indirect impact is the expected loss of small roadside businesses. Reduction of transit movement will mostly impact roadside fruit and vegetable vendors seasonally from summer to autumn.

Vejini village (1.3 km from bypass alignment) is located on the north-east slope of Gombori ridge, at 420 m from sea level. It is 7 km away from Gurjaani. According to the information provide by local authorities 3800 people live in the village, 60 of them are Persons with disabilities and other vulnerable persons, 700 retired persons. Houses in the village are mainly 2 floored and are built in 1960-80's. No Public health service is provided; people have to travel to Gurjaani city. No kindergarten and school are functioning in the village. Access roads condition is acceptable, in some places drainage ditches are needed. Centralized water supply exists in the village, but in summer water supply is scheduled 4 hours once in 3 days. Population is using spring and water wells as additional water source. Power supply is being provided for 24 hours. No direct adverse impact. An indirect impact is the expected loss of small roadside businesses. Reduction of transit movement will mostly impact roadside fruit and vegetable vendors seasonally from summer to autumn.

Tchandari village (1 km from bypass alignment) is located on north-eastern slope, at an altitude of 450 m, 3 km away from Gurjaani city. According to the information provide by local authorities 2214 inhabitants live in the village, 57 are Persons with disabilities and other vulnerable persons, 481 retired persons. Houses in the village are mainly 2 floors and are built in 1970-80's. Public health service is provided by Local Medical Center. One kindergarten and one school are functioning in the village Access roads condition is acceptable; roads in the village are in a bad condition. Centralized water supply exists in the village, but in summer water supply is scheduled for 1 hour in 2 days. Population is using spring and water wells as additional water source. Power supply is being provided for 24 hours. No direct adverse impact. An indirect impact is the expected loss of roadside businesses. Reduction of transit movement will mostly impact roadside fruit and vegetable vendors seasonally from summer to autumn. **Gurjaani city** (0.7 km from bypass alignment) is located in Alazani valley on Bakurtsikhe-Telavi motorway. 415 m above sea level, 122 km from Tbilisi. Gurjaani was declared as a city in 1934. Population - 10129 residents, 95 of them are IDP's, 486 are Persons with disabilities, 2412 retired persons and 762 families are vulnerable. Houses in the village are mainly 2 floors and are built in 1970-80's. Public health service is provided by 2 dispensaries and one hospital. 4 kindergartens and 4 schools are functioning in the village. Access roads condition is good. Centralized water supply exists in the village, but in summer water supply is scheduled and provided 8 hours a day. Population is using spring and water wells as additional water source. Power supply is being provided for 24 hours. No direct adverse impact. An indirect impact is the expected loss of roadside businesses. Reduction of transit movement will mostly impact roadside fruit and vegetable vendors seasonally from summer to autumn. **Gurjaani village** (0.5 km from bypass alignment) is located in north-eastern side of Gombori ridge, at an altitude of 400 meters. It is 2 km away from Gurjaani city. According to the information provided by local authorities 7600 people live in the village, 4 of them are IDP's, 693 are Persons with disabilities and other vulnerable persons, 1065 retired persons. Houses in the village are mainly 2 floors and are built in 1960's. Public health service is provided by dispensary. One kindergarten and one school are functioning in the village. Access roads condition is acceptable; roads in the village are

in bad condition. Centralized water supply partially exists, but water supply is scheduled by 2 hours. Population is using spring and water wells as additional water source. Power supply is being provided for 24 hours. No direct adverse impact. An indirect impact is the expected loss of roadside businesses. Reduction of transit movement will mostly impact roadside fruit and vegetable vendors seasonally from summer to autumn.

Chumlaki-Kitaani administrative unit (0.3 kms from bypass alignment) is located in north-eastern side of Gombori ridge, at an altitude of 420 meters. It is 4 km away from Gurjaani city. According to the information provide by local authorities 4760 inhabitants live in the village, 1 of them is IDP's, 15 are Persons with disabilities and other vulnerable persons, 700 retired persons. Houses in the village are mainly 2 floors and are built in 1970-89's. Public health service is provided by dispensary. Three kindergartens and one school are functioning in the village. Access roads condition is good; roads in the village are in acceptable condition. Centralized water supply partially exists and water supply 24 hours, but population is still using spring and water wells as additional water source. Power supply is being provided for 24 hours. No direct adverse impact. An indirect impact is the expected loss of roadside businesses. Reduction of transit movement will mostly impact roadside fruit and vegetable vendors seasonally from summer to autumn.

Infrastructure: Water supply is mostly centralized. The system includes: boreholes, storage tanks and distribution system delivering water to the users. Disadvantage of the system is the need in pumping. This makes the service rather expensive and unaffordable. Water supply is restricted.

For irrigation - river water is used. Irrigation infrastructure consists of above-ground concrete water conduits and channels. Most of the sections are damaged.

Sewerage system in the villages is not available.

The villages are connected to the national energy distribution grid. Individual, in some districts – cumulative meters are installed.

Gasification of the region is almost finished. Centralized gas supply is already provided to most of the villages in the area. Individual gas meters installed. In those villages where gasification is not finalized propane and firewood is used for cooking and heating.

In villages waste collection service is available. There is waste collection for regional centers and villages. The nearest operational landfills are in Telavi and Lagodekhi.

In the area the main roads are in proper state of maintenance. Regular seasonal rehabilitation - after snow or heavy showers is required. The quality of internal roads is poor. Road to vineyards and pastures are in particularly bad state of maintenance. These roads use to be completely destroyed in winter and rearranged by own strength by local community after the snowmelt.

The nearest airport is in Tbilisi.

Communication and information sources accessible in the area are the nationwide TV broadcasting channels and local TV companies. Satellite antennas are widely available and not too expensive. Along with these sources of information radio channels are offered. Printed media is accessible.

The region is within the coverage area of the mobile operator companies – Magti, Geocell, and Beeline.

Economy

The leading sector is agriculture, mainly viticulture and livestock. Vineyards occupy 20% of the agricultural land. Winery is the main sector of industry. There are several Wine and alcohol factories in the district, also other plants of different profile. Railways and highways pass through the district.

Among economical activities in Gurjaani municipality agriculture dominates. Trade and transport take up the same share, followed by industry and construction business. Processing accounts to 5% only, while administration, education, health care and services account for remaining 30%.

As an unskilled or vineyard and winery workers 70 % employs are men 30% women; in selling business like shops, pharmacies and small agricultural markets 75 % of workers are women;

The main crops cultivated in the area are:

Annual crops	beans, corn, wheat, sunflower
Fruit	Grapes, pear, walnut, cherry, cherry-plum
Vegetable and greens	Watermelon, melon, pumpkin, cucumbers, tomatoes, carrots, cabbage, onion, garlic, pepper

Local small businesses include: bakeries (tone), essential goods outlets, Pharmaceuticals, fuelling and car maintenance stations. Other possibilities of employment are administration offices, shops, wineries, Gurjaani ice-cream factory etc.

5.8 Social Background

The study area belongs to Gurjaani municipality. The main settlements located along alignment under consideration include: Bakurtiskhe, Vejini, Kolagi, Dzikoki, Chandari, Gurjaani Town, Gurjaani vill. Chumlaki and Khitaani

Population of the listed settlement according to the Gurjaani municipality data provided by local authorities is as follows:

Settlement	Population	Male	Female
Bakurtiskhe	3400	1673	1727
Vejini	3800	1791	2009
Kolagi	1380	578	802
Dzikoki	1500	732	768
Chandari	2214	987	1227
Gurjaani Town	10129	4136	5993
Gurjaani vill.	7600	3456	4144
Chumlaki and Khitaani	4670	2370	2300

Ethnic structure almost the same in all settlement affected by project: Georgians are 98,4%, Osetians 0,6%, Armenians 0,5%, Russians 0,3%, Azerbaijanians 0.1%.

Gender issues. In the study area women earn approximately 50% less than men. The households are headed predominantly males. On the other hand, in general in the region the number of female household heads is higher (18%) in the towns than in the villages (12%).

Migration. Statistics of migration from the region is not available. This includes economical migration to other regions/towns and abroad, migration of youth for education. Main destinations for migrants are – Turkey, Greece, Spain, etc. Sometimes migration is seasonal.

Bakurtiskhe village:

Education. There is one school and one kindergarten in Bakurtiske. Total number of students in the school is 423. 394 kids are attending kindergarten.

Employment – 95% of population are cultivating their land plots; 80% are unemployed; 30% are below the poverty line; 65% of families have average income; 5% have high income;

Vejini village:

Education. There is no school and kindergarten in Vejini. Total number of students and kids attending kindergarten is 750.

Employment – 80% of population are cultivating their land plots; 60% are unemployed; 45% are below the poverty line; 45% of families have average income; 10% have high income;

Kolagi village:

Education. There is one school and one kindergarten in Kolagi. Total number of students in the school is 122. 82 kids are attending kindergarten.

Employment – 60% of population are cultivating their land plots; 20% are unemployed; 24.4% are below the poverty line; 60% of families have average income; 4% have high income;

Dzikoki village:

Education. There is one school and one kindergarten in Dzikoki. Total number of students in the school and kids attending kindergarten are 188.

Employment – 30% of population are cultivating their land plots; 70% are unemployed; 80% are below the poverty line; 18% of families have average income; 2% have high income;

Chandari village:

Education. There is one school and one kindergarten in Chandari. Total number of students in the school is 130. 60 kids are attending kindergarten.

Employment – 50% of population are cultivating their land plots; 90% are unemployed; 17.5% are below the poverty line; 15% of families have average income; 0% have high income;

Gurjaani town:

Education. There is one school and one kindergarten in Gurjaani town. Total number of students in the school is 1598. 486 kids are attending kindergarten.

Employment – 20% of population are cultivating their land plots; 40% are below the poverty line; 55% of families have average income; 5% have high income;

Gurjaani village:

Education. There is one school and one kindergarten in Gurjaani village. Total number of students in the school is 317. 276 kids are attending kindergarten.

Employment – 60% of population are cultivating their land plots; 35% are unemployed 2.2% are below the poverty line; 96.6% of families have average income; 1.2% have high income;

Chognari and Khitaani village:

Education. There is one school and one kindergarten in Gurjaani village. Total number of students in the school is 350. 300 kids are attending kindergarten.

Employment – 70% of population are cultivating their land plots; 10% are unemployed 20% are below the poverty line; 70% of families have average income; 10% have high income.

5.9 Land ownership and land use

To reconcile the gaps between Georgia laws/regulations and WB's OP 4.12 the RDMRDI has drafted the RAP for the Project, ensuring compensation at replacement cost of all items, the rehabilitation of informal settlers, and the provision of subsidies or allowances for AHs that may be relocated, suffer business losses, or may be severely affected.

As indicated previously, impacts related to land acquisition required for project purposes is being assessed and mitigation measures identified based on local regulations, the WB's OP 4.12 on Involuntary Resettlement and a Resettlement Action Plan for the Reconstruction of Gurjaani-Bakurtsikhe Bypass Road based on the SLRP III Project's Resettlement Policy Framework dated March 2014.³

The potential impact scale is as follows:

Summary of Gurjaani-Bakurtsikhe road construction impacts

#	Impact	Unit	Qnt
1.	Total Land parcels affected	No	491
2.	Total land Area to be acquired	Sqm.	432768
3.	Private registered plots (Legalized)	No	129
		Sqm.	62084
4.	Private unregistered plots (Legalizable)	No	275
		Sqm.	130363
5.	State Owned Illegally Occupied by Private Users (Non Legalizeble)	No	39
		Sqm.	6724
6.	State Owned Not Used by Private Users	No	48
		Sqm.	233597
7.	Private agricultural land	No	366
		Sqm.	180163
8.	Private non-agricultural residential land	No	28
		Sqm.	8469
9.	Private non-agricultural commercial land	No	10
		Sqm.	3815
10.	State owned agricultural land illegally used by private users	No	36
		Sqm.	5758
11.	State owned land illegally used by private users as residential	No	2
		Sqm.	322
12.	State owned land illegally used by private users as commercial	No	1

³ See the RPF for the SLRP III project at <http://www.georoad.ge/uploads/files/SLRP%20III%20RPF51.pdf>

		Sqm.	644
13	State owned land unused	No	48
		Sqm.	233597
14.	Arable land for expected crop	No	66688
15.	Affected fruit Trees	Sqm.	18476
16.	Residential buildings	No	4
17.	Supplementary facilities	No	40
18.	Commercial buildings	No	3
18.	Fancies/Wells	m	3851
19.	Severely affected Households	No	247
20.	Vulnerable Households	No	122
21.	Resettled households (physically displaced)	No	4
22.	AH with registered plots	No	100
23.	AH with legalizable plots	No	241
24	AH illegally using State owned land	No	35
25.	AH with agricultural land plots	No	334
26.	AH with residential land plots	No	30
27.	AH with commercial land plots	No	5
28.	Total AH	No	350
29.	Total Affected Persons	No	1614

The impact of land acquisition required for road construction affects 1614 persons (788 males and 826 females). Further, 55 of the 122 vulnerable AHs are headed by women. Special attention will be given to the impact of land acquisition on women and other vulnerable groups during monitoring and evaluation of the RAP. Special measures will be implemented to ensure that the four families to be physically resettled restore their housing and living conditions.

6 ENVIRONMENTAL AND SOCIAL IMPACTS

6.1 Construction phase

6.1.1 Clearing the RoW

Construction will begin with the clearance of buildings, trees and bushes from the RoW, which passes through one private land plot and a degraded public land within and nearby the rural settlements. This will include: buildings are dismantled and heavy parts are carried away by means special transport; destabilization of upper layers of soil, etc.

6.1.2 Preparing the RoW

During preparation of corridors in the area of the new part of the motorway, the surface must be prepared to ensure safe work of constructing machines. Excess soil must be taken away. It is very important to store it properly. The following events are expected during these works: impact on plant species, as in several areas they might be cut down (table 5.6.1 List of Plant Species); impoverishing of fertile soil; noise impact on population and on wild animals in non-inhabited areas; changing of landscape on slopes, soil erosion. In general the ROW is passing fully anthropogenic landscapes and no impact on natural ecosystems is expected.

6.1.2.1 Cleaning and preparation of river bed for bridges construction

During construction the remnants of construction waste (e.g. parts of broken reinforcement walls, old box culverts) exiting in the Papriskhevi river bed and on river banks will be removed and will be disposed in agreement with the requirements of the national environmental legislation at the places designated by authorized company.

6.1.3 Construction of Temporary Buildings

These works include temporary camps that are needed during motorway construction. It also includes temporary roads needed for accessing working sites.

Different kinds of impacts are expected during setting up of a temporary camp (parking areas for cars and machines, temporary dwelling and office buildings, storing area will also be constructed). Storm water and water from temporary camp area may have an impact on surrounding area by activating of erosion and possibility of pollution; impact on plants that exist in given area; noise impact on population and on wild animals in non-inhabited areas; impacts caused by inadequate storage of waste. The area is mostly covered by agricultural and residential lands, therefore little wildlife occurs in the project area.

6.1.4 Traffic Impact

In the medium to longer term it is expected that an improved road network in the Project beneficiary region will induce a series of environmental impacts which, by their nature, cannot be reasonably quantified nor avoided or effectively mitigated. Such impacts may result from increasing traffic volumes, infrastructure development, intensification of agricultural production and promotion of tourism and nature-based leisure activities in the ecologically sensitive Project region. Such developments are among the expected benefits of the Project and positive from a socio- economic point of view, but likely to result in indirect adverse effects on natural habitats and species.

6.1.5 Building New Bridge

Building (reconstructing for expanding) a bridge over the river Papriskhevi may have impact caused by moving of construction vehicles and machinery along the river banks and works in the waterway resulting in increased turbidity, and pollution of river bed and water with fuel and lubricants.

The works associated with the construction could have an adverse temporary effect on fish and other aquatic fauna through siltation. This effect may generally be of minor importance in the case of this Project, as many of the rivers and streams in the Project area naturally contain relatively large amounts of suspended particulates. However, during the fish spawning season in spring such activities may impact the local fish populations;

Construction activities are planned for low water period in riv. Papriskhevi. This will reduce environmental impact and facilitate the bridge construction

6.1.6 Impact from Sourcing of Construction Materials

The road construction works require mainly asphalt, stones, sand and obtaining these materials can pollute the environment. For example asphalt factories pollute air as they use hard substances that may include Sulphur. They also disperse toxic air in large quantities. Significant emissions are characteristic of stone quarries that can cause serious health problems to those people who work there. If the quarry is situated near the inhabited area it will be dangerous for the health of population too. Stone breaking factories cause noise and produce dust. Obtaining sand and aggregate can destroy structural stability of river banks and have negative influence on ecology and hydrological conditions of the river.

6.1.7 Other Impacts Caused by Temporary Works

Creating work camps and temporary access roads can have other impacts. These include: compression of soil and ground, pollution of underground and surface water by oil and lubricants, especially during repairing of machines and equipment. Mechanical workshops, oil storage areas may become serious sources of pollution. Waste can also be considered as a serious source of hazard.

6.1.8 Impact on archeological heritage located within the RoW

Land clearance works, grading and excavations are associated with the risks of damage to underground archaeological remnants. The known archaeological sites have been identified and are listed in Chapter 4.3. However, chance finds may not be excluded. Project implementation area is of higher than average historical and archaeological interest.

6.1.9 Safety of Employees

Issues that are connected with personnel safety include: sanitary – hygiene conditions, collection and disposal of waste, drinking water, storage of materials, HIV/Aids, traffic safety, etc. Construction work itself also involves many inherent risks, particularly when work is conducted on a new or existing main road.

6.1.10 Impact on air

The road runs through rural and mostly scarcely populated areas, where so far environmental pollution is of comparably little concern.

During Construction phase impacts on air quality may arise from a series of sources:

Materials Extraction and Processing: Road rehabilitation works will require asphalt, stone, gravel, and sand and the extraction and processing of these minerals, even though not directly related to the Project, may be a cause of temporary environmental concern. A significant amount of air pollution is generated from asphalt plants, as they burn heavy oil, which may have high Sulphur content. In addition, large amounts of toxic gases are being emitted from asphalt plants. Quarries also create a significant amount of particulate emissions, which may entail respiratory and health problems for the workforce and, depending on the concrete location of the respective quarry, for local residents.

Air pollution control from vehicular sources falls under the responsibility of the MENRP. Regarding traffic emissions, the relevant standards that are currently in force in Georgia, date back to the Soviet period and cover soot, carbon-monoxide, nitrogen oxides, Sulphur dioxide and hydrocarbon. However, according to the MENRP, their enforcement does not take place in practice and there is no national policy or strategy to gradually reduce traffic emissions. 'Tekhosmotr' (a technical check) will however be required for heavy-duty vehicles (which includes lorries used during construction).

6.1.11 Noise and vibration impact assessment: road construction

Road construction will introduce additional noise sources to the local area. Road construction noise is caused by construction equipment and operations, i. e., there are two main sources of noise during the construction: noise resulting from road upgrading works, and noise from additional activities, such as transport of materials by HGV along the route. The dominant source of noise from most construction equipment is the engine, usually a diesel, without sufficient muffling. Only in a few cases noise generated by the process dominates (for example, impact pile driving, pavement breaking, etc.). Noise levels during the construction will vary depending on the construction activity and schedule. Noise levels from the main road construction equipment and operations are presented in Table 6.1.10.

Table 6.1.10 Construction equipment noise emission levels

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

The reconstruction of Gurjaani-Bakurtsikhe by-pass road will involve usage of some specific machinery (backhoe, bulldozer, trucks, heavy roller and etc.). Noise and vibrations will be inevitable from such activities as digging trenches, soil compaction, breaking of the old road pavement by hydraulic hammer and other. Frequent exceedances of acceptable noise levels resulting from construction activities are anticipated. Increased HGV movement along the route during the construction will cause noise-related disturbance. At the same time positive impact of the project will be reduction of noise in settlements, which will be by-passed by reconstruction of project road.

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

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

Noise limits for various working environments are estimated in General EHS Guidelines "Occupational health and safety" (issued by International Finance Corporation, 2007) which is the main document to rely on for noise and vibration issues. For heavy industry (with no demand for oral communication) limit equivalent noise level is set to 85 dBA; maximum - 110 dBA.

Noise impact assessment was performed identifying sensitive receptors (settlements, dwellings) within minimum distances from realignment boundaries as indicated in the Georgian standards for various construction related activities as it is described above. It is expected to have adverse noise impacts during road construction, but they are not considered to be of high importance. Settlement patterns along the Gurjaani-Bakurtsikhe by-pass road section imply that only few people will be exposed to elevated noise levels during the road construction (most likely the ones working in the fields near the construction sites). However, construction noise impact will be temporary and of medium significance, if environmental and safety requirements will be followed.

Vibration impacts are expected to be felt only locally near construction sites and should not have any negative impacts on residents.

There are dwellings, which may fall into the restricted zone established for asphalt plants or reinforced concrete production (300 m and 500 m respectively). Thus, to protect human health from the impacts of noise and vibration the following is recommended:

- to keep the requested distances from appropriate activities to the closest dwellings and residential areas;
- to keep restrictions on working hours on week days, weekends or public holidays, no night-time working.

People working at the construction sites will be exposed to elevated noise and vibration levels. According to the data presented in Table 6.1.10, most of the road construction activities will result in noise levels exceeding 85 dBA. Therefore it is recommended:

- To enforce the use of hearing protection by using hearing protective devices capable of reducing sound levels at the ear to at least 85 dBA;
- Exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the worker stands or sits, should be controlled through the choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure (EHS Guidelines, 2007).

6.1.12 Socio-economic impacts

Socio-economic impact assessment: road construction

Road construction will have both, negative (such as dust, noise, loss of roadside businesses, houses and land/harvest) and positive impact (temporary employment, improved transportation, road safety (including improvement of road safety of the existing road) from social-economic standpoint.

Issues related to the involuntary resettlement, including land acquisition and physical resettlement are covered under the Resettlement Action Plan for the Reconstruction of Gurjaani-Bakurtsikhe Bypass Road developed by *Roughton International* – a consultant to the RD.

Affected private land plots are classified into three categories according to the land use type and distance from the road that defines their compensation value. Expected loss of crops and agricultural land, business, and property include: cereals, vegetables, orchards, and residential houses, ancillary buildings next to residential houses, fences and walls. In total four families will need to be physically resettled. In addition to that, relocation of some sections of communication

lines such as water and gas pipes and power cables will also be required. Compensation of private land owners and other affected people will be completed prior to the commencement of works.

Relocation of parts of the communication infrastructure will be undertaken in the course of civil works the way causing minimal disruption to operation of this infrastructure.

According to the survey the list includes: 59 small shops, 15 car maintenance stations, 7 pharmacies, 5 large shops, 45 small fruit and vegetable sellers and 7 small bakeries. 90% of costumers of Shops, Pharmacies and car maintenance stations are locals. Reduction of transit movement will mostly impact roadside fruit and vegetable sellers.

Demographic Impacts

The impacts on demography will be of concern mainly for construction phase and would be related with the mobility of the population. Considering the construction phase, it is possible to speak of two different kinds of population mobility. Former is the forthcoming workers coming for construction and other staff. Latter is the population mobility due to the construction in the area.

It has been planned to employ approximately 250 workers in the construction activities of the Project. The required staff will first be chosen among local people. For the rest of the staff the contractor will rent guesthouses from the local population. For the workers to be selected among local people, the impact of migration mobility will be limited. In addition, those who will come to work in the construction will be directed to work in the determined parts of the project; and this will also reduce the negative impact of migration mobility. The low rate of workers coming from outside compared to local population will additionally decrease the impact on the socio-cultural structure of the region. It is not expected that there will be migration to or from the area resulting from positive or negative effects of the project. Since the construction activities will be held in a limited area, and all loss of settlements will be compensated according RAP, local people are not forced to emigrate. Therefore, the impact of the project on the demography and any migration movement is extremely low, which can be called as insignificant.

Economic Impacts

As the workers and staff coming to the region for construction activities would increase, the demand for the goods and such is also expected to increase. Thus an increase in demand might cause an increase of prices for certain goods at the regional level. However, the limited incoming population and the economically integrated character of region to the bigger settlement areas are predicted to reduce the inflationist impact resulting from demand increase and finally would remain at low level. On the other hand, this would bring the opportunity for trade in the area. The goods and services needed during project activities will be purchased from the region. Therefore, trade in the region will increase as a result of construction activities. If all activities are conducted simultaneously, a significant increase in the economy of the region is expected. In addition, transportation infrastructure for the project activities within the region will be improved. As a result, the economic integration will increase, which is a positive impact.

6.2 Impacts of Motorway Operation

In the motorway operation stage the main attention was paid to the two main aspects of environment connected with an operating road, to noise and ambient air.

6.2.1 Air Quality

Data for a 500 m section of the 17.0 km designed motorway are as follows (transport unit/h):

14000 units/day /24sT = 583 units/h; $k = 2.27$; $583 * 2.27 = 1324$

Table 6.1:Transport Method and Probable Intensity of Movement

Vehicle types	In both directions	%
Passenger cars on petrol	662	50
Passenger cars on diesel	530	40
Trucks and buses on diesel	132	10
Total	1324	100

Due to the fact that the regulation of ambient air is carried out only for the settlements, the calculation has been carried out for the 500 m section alongside the settlement while taking into consideration likely future vehicle movement.

Table 6.2: Pollutants and Emissions

Substance	Code	Emission (g/sec)
Carbonic acid	337	0,50176389
Nitrogen dioxide	3301	0,17864889
Nitrogen oxide	304	0,02903044
Hydrocarbons (petrol)	2704	0,06574028
Hydrocarbons (Oil fraction)	2732	0,07750347
Soot	328	0,01134431
Sulphur dioxide	330	0,0130325
Formaldehyde	1325	0,00074028
Benzapyrene	703	0,00000005

This shows that the formed concentrations in respect of sulphur dioxide and the net effect of the group (nitrogen oxide+ nitrogen dioxide+sulphur dioxide) reach maximum values at about 50 m from the axis of the motorway in both directions (the permitted rate of influence) and for the other substances does not exceed ambient air standards for the settlement and should therefore not have a negative effect on the living conditions of the population and the environment.

6.2.2 Drainage

During rainfall and snow melt water will drain from the roadway towards the river within this section (Papriskhevi). This will cause a negative influence on the soil and surface waters, since the storm

drainage is mainly characterized by physical pollution (suspended particles), the source of which is the dust disseminated in the air and vehicle exhaust.

The source of pollution can also be the rubbish accumulated on the surface, the products created as a result of the damage of road surface.

While taking into consideration the expected movement of trucks as well as passenger cars, it is probable that within 10 minutes from the start of the rain the concentration of suspended particles will be up to 200 mg/l. According to the calculation provided in Working Paper 5 for this ESIA Report, there is expected to form 14190 m³ of storm water on the bypass road.

6.2.3 Socio-economic impacts

Considering that at the operation phase road maintenance will take place, small number of local workers could be employed, positive impact on the local population is anticipated.

As the agricultural land loss due to project activities constitutes a very small percentage of the total agricultural lands, it is expected that the households doing agriculture will not lose their economic gains. In addition, the areas to be used by project facilities are not utilized by animal husbandry activities either.

All affected people including those four families to be resettled, will receive adequate compensation in accordance with Resettlement Action Plan. Compensation will give the opportunity to people living in the region not to lose income and social networks because of project activities. On the contrary, project activities will create a source of job opportunities and enable people to participate more actively to the social networks, and finally social integration will increase. In addition to that, the improved transportation network will additionally give increase to the dynamic social structure. Within and across region, the interaction will be increased.

6.2.4 Residual Impacts

The bypass road will create favorable conditions for the fast development of cities, industrial parks, transit of goods to Azerbaijan, commercial sectors and tourism in the eastern part of Georgia. Those are major positive impacts of the road construction from the socio-economic point of view.

Development of the modern road will increase cargo traffic through the road. Construction of Gurjaani-Bakurtsikhe road will improve the tourism industry in the area and provide easier access to the various tourist attraction sites along the road corridor such as nature reserves, cultural and historical heritage sites. The road will improve the tourism industry in the area and provide easier access to these tourist sites.

Increased tourism may also be beneficial by encouraging local officials to preserve the aesthetic value of the entire region. However, increased tourism has the potential to over commercialize and negatively impact natural tourist locations. This should be carefully monitored by local officials.

7. PROJECT ALTERNATIVES

7.1 Alternative 1 – Purple line

Alternative 1 is the existing road, part of the secondary road, Akhmeta – Telavi – Bakurtsikhe (ATB road), one of the main roads in the Kakheti region. The existing road passes through the town of Gurjaani and the villages Bakurtsikhe, Kolagi, Dzirkoki, Chandari, Vejini and Chumlaki, which are densely populated areas and the section in question carries high volumes of heavy transit traffic, resulting in a high rate of road accidents. The idea of the by-pass road was based on avoidance of the densely populated settlements and improvement of traffic safety. Improvement of the existing road will cause Social complications, because the road had to be widened and many households along the existing road would be under the impact. It would not be possible to avoid disturbance of rest of population from noise and air pollution because of increased traffic.

Based on the above mentioned, Purple Alternative was not considered as a feasible option.

7.2 Alternative 2 – Red line

It is intended that a bypass be created connecting the international road Tbilisi – Bakurtsikhe – Lagodekhi – Azerbaijan Border (TBL road) with the existing secondary road, avoiding the town of Gurjaani and the villages Bakurtsikhe, Kolagi, Dzirkoki, Chandari, Vejini and Chumlaki.

A design for a road bypassing these settlements was prepared in the late 1980s and partially constructed. Although the roadbed and structures are seriously degraded this alignment is clearly one of the most feasible bypass alternatives.

The route of the original 1980s bypass starts at the junction of the Tbilisi – Bakurtsikhe – Lagodekhi road and the Bakurtsikhe – Telavi – Akhmeta road and runs north-eastward from there for two kilometres. The route underpasses the existing disused railway line at Km 1.8 before turning ninety degrees to run north-westward parallel to the route of the existing road and disused railway line.

Thereafter the route runs parallel to the disused railway line to Km 8.0 where it turns away from the railway alignment to run northwards. It crosses a major streambed at Km 9.0 before turning and running north-westward for 4.5 km to a major river crossing point at Km 13.5. This section runs through three built up areas where there are significant obstructions. The first is between Km 9.1 and Km 10.1 where buildings and a communications tower obstruct the route, the second is at Km 11.5 and the third is at Km 13.1 where the route is constrained by buildings.

The original bypass route continues for 0.9 kms after the river crossing before converging with the existing Akhmeta-Telavi-Bakurtsikhe road and disused railway line, at Km 14.4.

The route traverses agricultural land except for the built-up areas noted. There is intensive vineyard cultivation on much of the agricultural land.

A desk study of the project area has been undertaken to ascertain whether there are any better options than the route selected for the bypass in the 1980s. A bypass on the lowland side of the valley is clearly preferable to one higher up the slope on the other side of the existing route. Any other alternative alignment on the lowland side, to the 1980s bypass route, would have a greater length (increasing both capital and operating costs) and would require land acquisition for the entire Right of Way with attendant increased costs, social disruption and adverse environmental effects

(the removal of land from agricultural use). There appears to be no better option than adopting the general alignment selected in the 1980s and capitalising on the value of the established Right of Way. This 1980s bypass Alternative 2 has a length of 14.5 km.

Implementation of the project using Alternative 2, with variation to Green line, close to Chumlaki village at PK 127 – PK 149, could be considered as a preferred alternative. Positive aspects of the Alternative 2 are:

- Existing, purchased right of way (ROW);
- Avoidance of loss of agricultural lands;
- Low level of top soil loss;
- Reduction of pollution by cleanup of the ROW from illegally dumped waste;

7.3 Alternative 3 – Green line

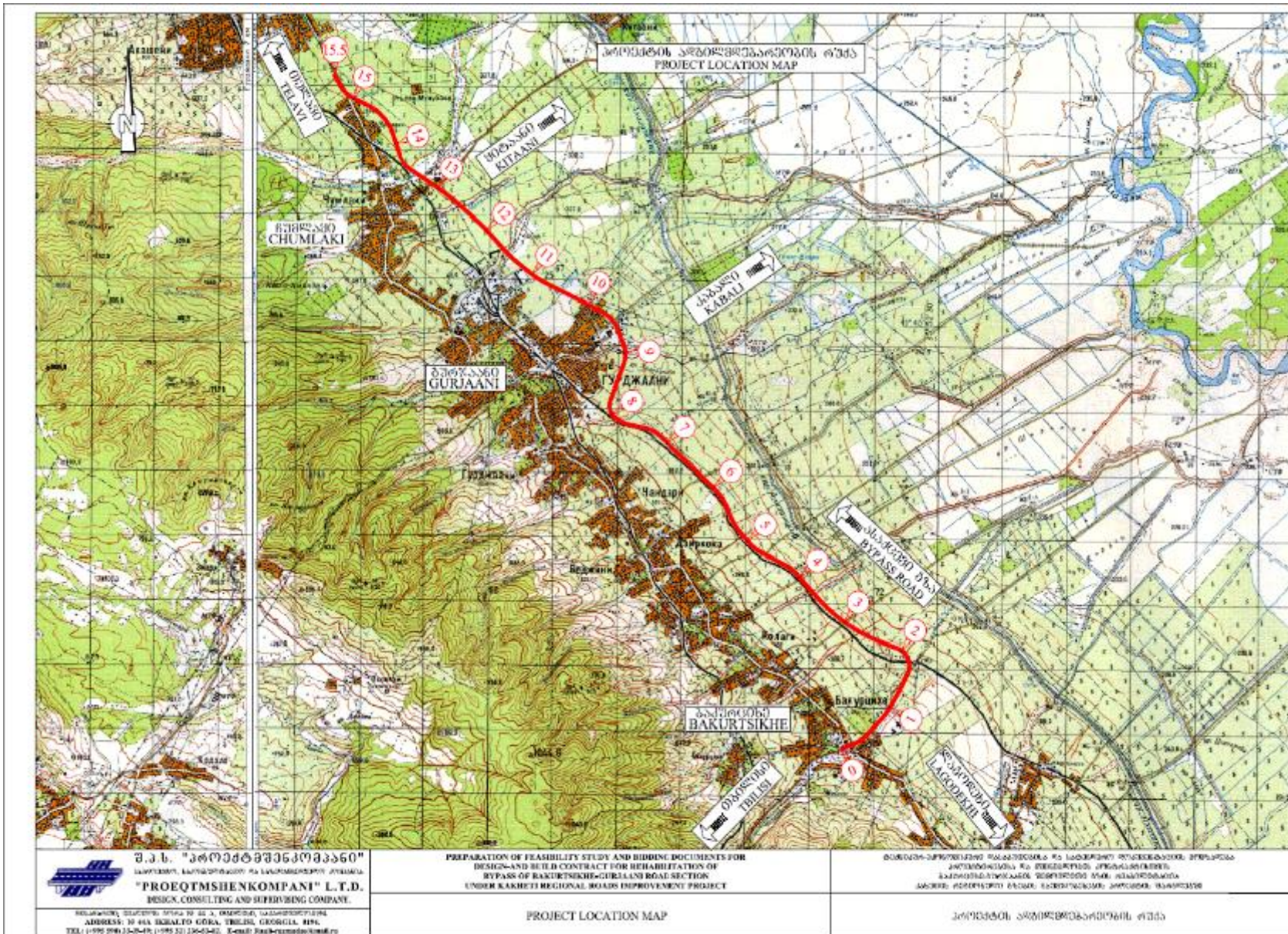
During design variation to the Alternative 2 (red line) was proposed. Variation 1 is at PK 71 to PK 92 of the Alternative 2. During the public meeting local population immediately objected this proposal, because the Green line pass through wine yards with very high value. At the same time this variation to be rejected because of impact on agro-biodiversity habitats.

Variation 2 of the route is required at the Chumlaki (PK 127 – PK 149) end of the alignment. Considerable building development has taken place since the original bypass route was established. Also the original bypass route approaches the existing main road at an oblique angle near the existing “at level” railway crossing. These factors make it difficult and disruptive to create a satisfactory junction at this termination point. An extension to the bypass route is proposed to create an alternative termination point closer to Telavi, this bypasses the recently developed area and allows creation of a satisfactory junction.

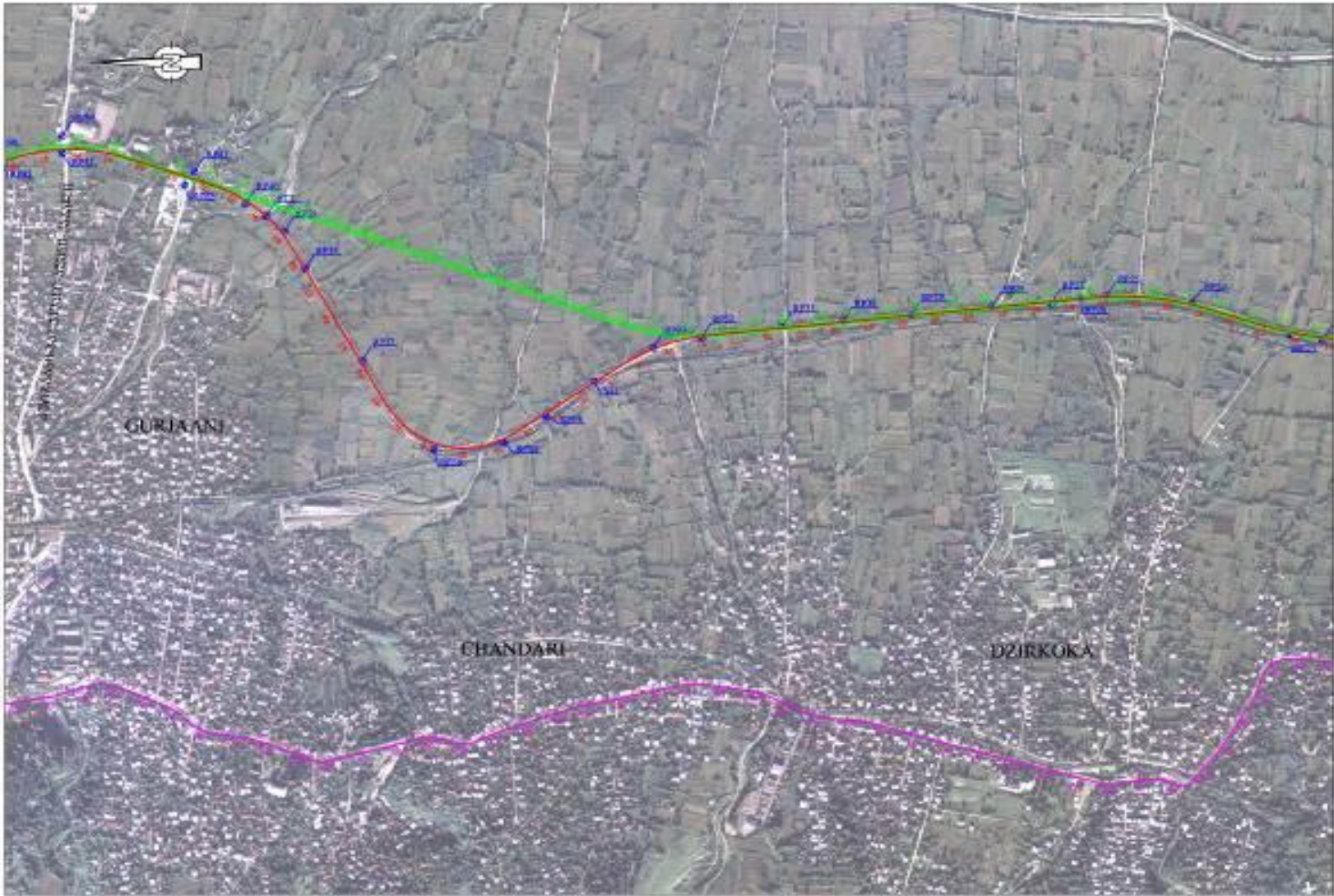
7.4 Conclusion

After reviewing of the proposed alternatives it is clear that from environmental and social point of view preferred alternative is Alternative 2 (Red line) with Variation 2 from the Green line.

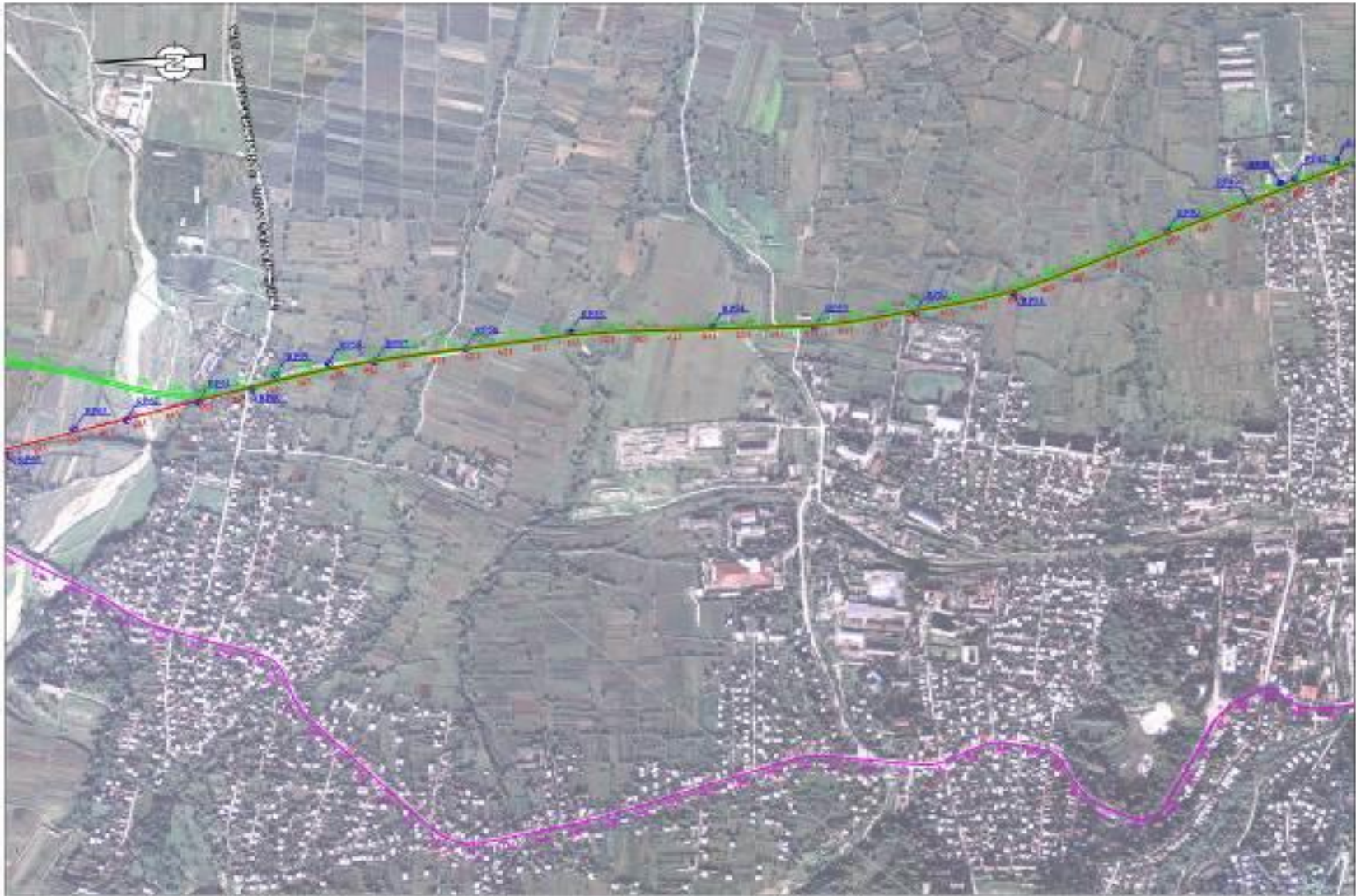
The preferred Alternative 2 follows the alignment of 80's and only at the end at pk 127 -149 moves to Alternative 3. Mainly the ROW of Alternative 2 is already cleared in late 80's and low environmental impact is anticipated. For the last part of the ROW (pk 127 -149) is proposed to follow Alternative 2 to avoid disturbance of about 20 households in village Chumlaki.



Map 1



Map 2



Map 3



Map 4

8. IMPACT MITIGATION

This chapter formulates the expected environmental and social impacts at the bypass road construction and operation stages, and discusses mitigation measures prescribed for avoiding or minimizing potential negative impacts. If an impact may not be avoided or fully mitigated, it is discussed as a residual impact.

8.1 Mitigation Measures: Construction Stage

8.1.1 Biodiversity Protection

The road construction is not expected to have significant impact on the fauna.

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

The plants will be covered with dust, which will impact the feeding base and reproduction of vertebrate and invertebrate species; the impact is limited to the territories in the immediate vicinity (adjacent to) of the road. Dust reduction measures should apply, such as covering materials, removed topsoil and waste to avoid wind erosion and spreading around; restriction of the speed of trucks delivering materials to the construction ground, covering friable material with tarpaulin during transportation, avoiding high dumping of materials during unloading. If required, the ground (machinery stationing, camp site) should be watered to avoid generation of dust

Noise and vibration level should be reduced by means of securing proper technical maintenance of machinery/vehicles, adherence to no horn policy, strictly keeping to the stationing/operation ground during the construction and operation;

The fuel/oil storage should be equipped with adequate secondary containment (impermeable cover of the area, and the containment of sufficient capacity to avoid pollution of soil/water outside the berm and/or washing it off by the runoff);

Spills should be immediately cleaned up to avoid spreading of pollution;

Trenches or pits, if made, should be fenced or protected to avoid entrapping and injuries of the fauna species. Bright colored ribbons may be used for big animals (e.g. cattle), while metal plastic and other shields/fences may be used for small animals. If, despite of the mentioned precautions, small animals turn to be entrapped, upon completion of the shift, planks or medium size twigs must be made available for the animals to escape from the pits/trenches after the night. Pits and trenches must be checked prior to filling up.

In order to minimize disturbance to plants and animals, any toxic and hazardous materials required for construction, including asphalt will be properly stored and secured, and sited in approved locations. Vehicles and equipment shall be maintained in good operable condition, ensuring no leakage of oil or fuel and the fitting of proper exhaust baffles.

Since due to the existing situation felling of trees cannot be completely avoided, they can be handed over to the local authority for the purpose of selling the removed trees. For the reinstatement of the RoW and for maintaining an ecological balance, each removed tree will be compensated through replanting along the RoW of at the rate of 1:3 for non-red data list and 1:10 for the red data list. These measures pertain removal of trees in the State owned areas (List of species and number of trees are provided in the chapter 5.6.1). Removal of fruit bearing or other trees growing in the private

plots, compensation will strictly follow the RAP. If the need of Red data tree logging will appear, all relevant procedures required by National legislation will be applied.

Requirements for the contractor.

The construction Contractor and RDMRDI, based on the pre-entry survey data, should apply all efforts to minimize the impacts on the red list species and accordingly refine the route. Inventory of each single specimen of the red data tree species remaining under the impact after the route refining should be conducted. The extraction of the red data tree species from the natural environment should be conducted according to the requirements of the Georgian Law on Red Data List. Tree felling should be conducted in accordance with the procedures requiring change of category of lands attributed to the Forestry Fund.

The rule and procedures of the change of category of the State Forest Fund are implemented according to the rule of conduct approved by the order of the MENRP N5 (15th February, 2010) on “the decision on the assignment of special forest use right within the State Forest Fund as well as special tree felling was made by the MENRP upon agreement with other interested agencies, except for the cases as stipulated by Part 3, Article 33 of the Forest Code of Georgia (on the latter the decision is made by the Government of Georgia, while this part of the Forest Code implies the following: any change, which is aimed at the decrease of the State Forest Fund, should be well-grounded.

A compensatory tree planting plan will be developed and implemented by Contractor. This plan will specify not only species, but provide information on the soil, existing forests around, detailed documentation on land ownership, phytosanitary conditions in forests around the sites selected for tree planting, species and age of seedlings, timetable of planting, maintenance needs and institutional arrangements for maintenance, physical protection of young plantations, etc.

8.1.2 Reducing Disturbance of Communities

During construction works, special attention shall be paid to the aspects effecting the populated environment, in particular: during the transport movement on the roads with only pavement subgrade in settlements, watering or temporary roads should be arranged as necessity.

In order to mitigate the effect on ambient air it is necessary to:

- Repair the existing subgrade road layers;
- Regular watering of both types of pavement subgrade in dry weather;
- Regular check of transport and exhaust gases; and,
- Vehicles with non-standard emission shall not be allowed.

In connection with the influences caused by noise and vibration:

- In order to carry out any work equipment should be used which will minimize the associated noise and in addition, the technical maintenance will be conducted to reduce the levels of noise and vibration;
- The works must be carried out in view of a background noise. It should not be allowed to leave the equipment and machines in idling. Their engines must not work in idle regime without necessity.

Requirements for the contractor. Establish direct contact with the local population in the zone of construction influence in order to receive information connected with the population requirements

in time, which will lessen the possible conflicts. The contractor should provide clear contact information for the public to send questions and/or complaints.

8.1.3 Temporary Camps and Access Roads

Contractor will be using mainly local housing facilities as a camp on the territory of the project, but in the event that a contractor needs other areas, he can additionally look for the territories acceptable for him. He will also be responsible for conforming to all the environment safety requirements in connection with the arrangement of construction camp, given below.

Significant attention must be paid to the question of temporary access roads since their incompetent choosing can increase a negative effect on social and environmental conditions.

Contractor must design temporary camps in a way to minimize impact on plants existing on site (trees, bushes). In the design must be incorporated treatment of the storm water prior to discharge into the stream

The work shall be carried out along with removing the soil layer and placing it in the area chosen beforehand. The conditions of soil preservation shall conform to the Land Reinstatement Plan.

Wastewater from construction camp (shower, kitchen, toilet, etc.) must be collected in special septic tanks and has to be preliminarily approved by the engineer. Cesspool emptier truck will discharge wastewater into Gurjaani sewage system in the place agreed with the local authority.

It is also necessary to take measures on mitigating the effect of the storage and distribution of mineral oils. These include:

- Around the tanks for storage and distribution of mineral oil a barrier of waterproof material shall be arranged;
- The area inside the barrier shall also be finished in waterproof material;
- For the operations of receiving-giving out of fuel by means of tank trucks the area is to be prepared with the view of the measures against spillage; and,
- Re-fueling during the construction of bridges on the river Papriskhevi is strictly prohibited in the stream channel of the river and its adjacent terraces.

When choosing a route for temporary access roads, as a minimum, the following two aspects shall be taken into consideration:

- They must be as far as possible from settlements; and,

The preparation works for temporary access roads must begin with the removal of the soil layer and its placement in the area chosen beforehand.

8.1.4 Bridge Construction

In order to avoid sedimentation, barriers of inert material shall be used during straightening of the banks on the terrace side of the river Papriskhevi. It is necessary to check the river banks and the close rocks for the falling of soil and soil layers in order to carry out the restoration and bank protection works if necessary. The river and streams in the Project area naturally contain relatively large amounts of suspended particulates. The bridge work should be planned to be undertaken in the winter months when the river flows are more consistently lower than the summer months when snow melt swells the river. Any potential impacts on fish spawning (*Barbus mursa* and *Barbus capito*), which may still occur in the downstream area (April to September), will also be avoided. . When filling the bridge footings with concrete it is necessary to minimize the working time. No materials shall be deposited in or near the river.

The technical conditions of vehicles and machinery in rivers and streams and their terraces shall be checked daily in order to prevent the leakage of oil minerals in the water.

During construction, river flow will be temporarily re-directed, it is necessary to arrange water-pipes, fish-passes, water-barrier channels for the free movement of fish and other organisms, as well as the preservation of water quality and flow.

8.1.5 Storm Water Drainage

The storm runoff shall be accumulated by means of the accumulation channels (ditches) arranged on both sides of the roads, which while taking into consideration the relief topography (inclination) shall be connected with specially arranged drainage outflow systems after going through which the storm water shall flow mainly to the local relief and surface waters. This will prevent the development of erosion processes along the road.

In this connection for the effective work of the measures for decreasing the effect, the following works shall be carried out:

- Periodical cleaning of certain sections of ditches in order to provide oblong inclination of their bottom- not less than 10%;
- Carrying out works for the reinforcement- repair of certain damaged areas of ditches;
- Preservation of the water pipes in working condition; and
- Periodical cleaning of drainage outlet equipment from soil, then the restoration of embankment and planting of the plants with well-developed root system.

8.1.6 Health and Safety

Providing the workers and employees with a detailed information on works, considering health and environment protection conditions and carrying out the special instruction training and technology, equipping the personnel with personal protection equipment.

It is necessary to draw up a special regulation plan for the personnel working in the stream canal of the river Papriskhevi, connected with the avoidance of the effect in case of a sudden flood and to carry out training connected with the plan.

Checking of the knowledge of the technical personnel engaged in the works (bulldozer and excavator drivers, special transport drivers, etc.) in safe action as well as the supply of special information on environmental protection for the personnel engaged in construction.

8.1.7 Cultural Monuments and Archaeological Areas

Chance finds may be encountered during earth works. In such case, works contractor must take all activity on hold and inform RD on the finding. RD shall formally communicate with the National Agency for Cultural Heritage Protection (NACHP) under the Ministry of Culture and Monuments Preservation and receive guidance on the further course of action. Urgent excavation and site conservation works must be allowed prior to resumption of works. Construction contractor may be allowed to the site only upon receipt of written communication from the NACHP.

Road construction will not have any physical impact on any cultural/historical monuments which exist within the project area, as they are in a safe distance from the RoW. It is possible, though, that construction works affect natural landscape around the monuments, thus influencing their aesthetic value. Landscape reinstatement plan will ensure that this issue is addressed adequately.

Requirements for the contractor. Contractor's obligations in case of chance find are noted in the EMP, which will be part of the contract. Hence adherence to instructions for chance find handling will be contractually binding for works providers.

8.1.8 Construction Waste

Prior to commencement of works, contractor must obtain from the local authorities written permission for temporary storage and for permanent disposal of construction waste and excess material of various types. Suggestions for sites of permanent disposal of waste should be run through the MENRP and the technical supervisor of works to ensure that these sites are indeed acceptable from environmental standpoint. Disposal of hazardous waste and garbage should be undertaken through the Solid Waste Management Company. Before transporting construction waste to its final disposal site, it should be piled in places designated for temporary storage of waste. Detailed waste management plan is provided in Annex 1.

8.1.9 Quarries and Borrow Pits

Purchase of inert construction materials will be allowed only from the licensed legal and/or physical bodies. Contractor may also hold or wish to obtain a resource use license and operate own quarries. Opening of new borrow pits will be avoided if those already in operation can be used instead. Operation of quarries and borrow pits, as well as extraction of gravel from river terraces, will be carried out in accordance with the conditions of a license issued by the National Environment Agency of MENRP.

Terms and rules of a license for material extraction are specified in the license along with the exact location of a site, volume of permitted extraction and maturity of a license. Licenses are issued through auctioning. According to the law, the license is granted to the proponent presenting the best proposal that shall meet the criteria stipulated for resources and environmental protection, and recognized as the most economical acceptable. The validity of the license for abstraction of construction materials may be up to 30 years, while short term licenses may vary from 2 to 5 years. A license holder is obliged to ensure sustainable use of the resources with due regard of environmental and resource protection rules; guarantee safety of works with consideration of ambient air, water, soil, forest, protected areas, protection norms for historical and cultural monuments and buildings. A license holder is obliged to stop operation if any rare plant or object of aesthetic value is found. The fact must be immediately communicated to relevant governmental authorities.

The license holder is responsible for restoration and reinstatement of the used plot. The license can be terminated in case of non-compliance with license conditions, including environmental requirements. Liquidation or conservation costs are covered by the resource user. In case of license termination the owner automatically loses right to the land plot.

If the contractor decides to use own borrow pit/quarry the following requirements must be met:

- Sufficient resource in the proposed quarry must be insured to make a site financially viable; including rehabilitation expenses.
- Topsoil must be removed and stockpiled until reintroduction. The topsoil should not be buried, driven on, excessively handled, contaminated or stockpiled so as to hinder final land-use.
- If required, erosion protection must be provided.
- To ensure safe operation the access tracks must be of adequate width: the track should be twice the width of the widest vehicle in the case of one-way traffic and three times the width of the widest vehicle in the case of two-way traffic.
- Gates and fences should be designed, regularly inspected and repaired to prevent non-authorized entry; signs at any insecure locations on a site indicating the risk must be provided.
- Operation and decommissioning of the quarry/borrow pit must be performed in compliance with the conditions of the quarrying license and with due regard to environmental standards.

- Upon completion of the license term, the quarry/borrow pit area affected by the development should be re-cultivated: the topsoil reinstated, the status of the site restored to the state close to the initial state (for instance, the site may be planted with vegetation).

Should material be abstracted from the riverbed, the riverbed and the landform may not be adversely affected. Abstraction of gravel should not be carried out in high water period. The operation site must be protected by a gravel mound (up to 2m wide). In compliance with the national legislation (Law on Natural Resources) abstraction of inert material from a riverbed is prohibited in case the activity violates stability of any hydro technical structures (a dam, a retaining wall). Sourcing is not allowed from sections where solid drift is not sufficient for 'feeding' the banks. In such areas, inert material abstraction from the river terrace within 50 m strip from the riverbed and directly from the stream is strictly prohibited.

Risks associated with the licensing legislation currently in force are that it allows (i) extraction of material from the water stream given that sedimentation pattern is believed to be sufficient for natural reinstatement of the deformed river bed, and (ii) postponing site reinstatement of any part of the site till expiration of the license term. At the same time, construction machinery is not allowed to enter water stream, and license holders are not allowed to keep borrowing on hold for extended periods of time without reinstating a site and giving up the license even if its term has not expired. Department of Environment Protection Supervision exercises control over the performance of extractive license holders.

8.1.10 Social impact mitigation

Impacts related to land acquisition required for project purposes is being assessed and mitigation measures identified based on local regulations, the WB's OP 4.12 on Involuntary Resettlement and a Resettlement Action Plan for the Reconstruction of Gurjaani-Bakurtsikhe Bypass Road based on Resettlement Policy Framework of the Third Secondary and Local Roads Project dated March 2014.⁴

Affected private land plots are classified into three categories according to the land use type and distance from the road, this defines their compensation value. Expected loss of crops and agricultural land, business, and property include: cereals, vegetables, residential houses, ancillary buildings next to residential houses, fences and walls. In addition to that, relocation of some sections of communication lines such as water and gas pipes and power cables will also be required. Compensation of private land owners and other affected people will be completed prior to the commencement of works.

Relocation of parts of the communication infrastructure will be undertaken in the course of civil works the way causing minimal disruption to operation of this infrastructure.

The civil works contracts will include provisions to encourage employment of women. Additionally, women headed households will be considered vulnerable and special assistance is provided in the land acquisition and resettlement plan.

The indirect impact of reduced transit movement will mostly impact roadside fruit and vegetable (seasonally from summer to autumn) sellers and could be mitigated by municipalities by establishment special areas for small markets along the new road, this will give opportunity to sellers to continue their business. This issue must be addressed by municipality

⁴ See the RPF for the SLRP III project at <http://www.georoad.ge/uploads/files/SLRP%20III%20RPF51.pdf>

8.1.10.1 Grievance redress mechanism

Objective

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

In order to provide an accessible mechanism to all the affected persons to raise their issues and grievances related to social and environmental issues, a Grievance Redress Committee (GRC) will be established. The GRC will be officially recognized 'non-judicial community based body that will seek to resolved non-judicial disputes arising out of various matters related to the implementation of EMP and RAP. The fundamental objective of GRC is to resolve any environmental and resettlement related grievances locally in consultation with the aggrieved party to facilitate smooth implementation of the EMP and RAP.

Grievance Mechanism for Environmental and Social Issues

Type of Grievance

The following are some of the environmental and social issues that could be subject for grievances from the affected people, concerned public and NGOs

- Dust, noise and air pollution from construction activities
- Nuisance
- Intensive schedule of construction activities
- Inappropriate timing of construction vehicle flow
- Traffic movement
- Water pollution
- Waste disposal
- Disturbances to flora and fauna
- Impacts on protected areas and cultural sites
- Health and safety
- Criminal activities
- Failure to comply with standards or legal obligations
- Unauthorized use of private land
- Maintenance of access roads used by the project
- Request for additional access from the local community (box culvert, overpass)

Composition of GRC

The following members are recommended to form a GRC to look into the environmental and social matters.

Representative of RD, Kakheti Region– Convener
Resettlement and/or Environmental Specialist of RD – Secretary
Environmental and Social Specialist of Construction Supervision Consultant – Member
Environmental and Social Specialist of the Contractor - Member
Representative of Gurjaani Municipality – Member
Representative of APs – Member

The scope of work and the Terms of Reference for GRC are:

- (i) The GRC shall review, consider and resolve grievances related to environmental and social issues during implementation received by the RD
- (ii) Environmental Specialist of Construction Supervisor Consultant (CSC) is responsible for conducting investigations on these grievances
- (iii) Any grievance presented to the GRC should ideally be resolved on the first day of hearing or within a period of three weeks, in case of complicated issues requiring additional investigations
- (iv) GRC is empowered to take a decision which is binding on RD and considered final.
- (v) A minimum three (3) members shall form the quorum for the meeting of the GRC

GRC meeting will be held in the RD's regional office or other locations agreed by the committee. If needed GRC members may undertake field visits to verify and review the issues at dispute.

Procedures for Filing GRC Cases

Any concerned person can raise a grievance with the GRC. There are several ways one can report a grievance:

- Send a completed Grievance Form (which is available in Gamgeoba of Project villages) to the Secretary of GRC to address in the form;
- Contact the Secretary of GRC over the phone. The contact details are also provided in the form;
- Send an email to the address provided in the form;

The grievance will be reviewed and will be decided whether it will be taken into further consideration. In case the grievance is not connected to the Project related activity or in case the Project authority finds that they are working within the applicable Georgian and international standards, the grievance will not be further processed. In these cases this will be explained in writing to the grievant.

In all other cases the GRC will investigate whether they have failed to work to the intended standard and, if they have, identify measures which might be taken to protect against the incident occurring again.

The grievance mechanism will be made public through the public consultations and information leaflets during implementation.

Table 8-1: Claims and Comments Submission Form

Reference #	
Name, Last name	
Contact Information	<input type="checkbox"/> Mail: Please indicate the postal address: _____ _____ _____ <input type="checkbox"/> Telephone: _____ <input type="checkbox"/> E-mail: _____
Please indicate the preferable means of communication (Mail, Telephone, E-mail)	
The language desirable for the communication	<input type="checkbox"/> Georgian <input type="checkbox"/> English <input type="checkbox"/> Russian
Describe the incident or the claim:	What happened? Where it happened? To whom it happened? What is the result of the problem?
Date of Incident or Claim:	
	<input type="checkbox"/> Single incident/claim (Date _____) <input type="checkbox"/> Took place several times (how many times: _____) <input type="checkbox"/> Current (the existing problem)
To your opinion how this problem should be solved?	
Signature: _____	
Date: _____	
Please return this form to RDMRDI of Georgia: Head of the Environmental Division, 12 Alexandre Kazbegi ave, Tbilisi, Phone: 032-237-05-08 or email: info@georoad.ge	

Grievance Review Process

In some instances it may be possible to resolve a grievance straight away. Where this is not possible the GRC will work through the steps shown below:

Step 1: Receive Complaint

Once the GRC receives a completed form or get notification of a problem, it will assign someone to be responsible for resolving the grievance.

Step 2: Acknowledgement

Secretary of GRC will acknowledge receipt of a grievance by letter within 10 working days of having received the grievance. The acknowledgement will specify a contact person, their reference indicator and an anticipated target date for resolution.

Step 3: Investigation

GRC will work to understand the cause of every grievance. GRC may need to contact the claimant during this time.

Step 4: Resolution

Once GRC have investigated a grievance, GRC will write to the claimant the results of the investigation and of GRC proposed course of action, should GRC believe any to be necessary.

If the claimant considers the grievance to be satisfactorily resolved GRC would appreciate sharing that with him/her by signing a Statement of Satisfaction. If the grievance remains unresolved it will be reassessed and GRC will have further dialogue with the claimant to discuss if there are any further steps which might be taken.

Step 5: Follow Up

The GRC may contact the claimant at a later stage to ensure that our activities continue to pose no further problems.

All grievances shall be monitored by the GRC, who will be responsible for ensuring that a plan is developed and internally approved by the GRC (and if appropriate discussed with the claimant) for any unresolved grievances. The plan's objective will be to bring unresolved grievances to a swift and fair resolution.

Confidentiality and Anonymity

The claimant may wish to raise a concern in confidence under this procedure. If claimant asks the GRC to protect his/her identity, it will not be disclosed without his/her consent. Details of submissions and allegations will remain secure within the team responsible for investigating the concerns. However, the situation may arise where it will not be possible to resolve the matter without revealing claimant's identity (for instance where it is required to give evidence in court). The investigative team will discuss with the claimant whether and how best to proceed.

In case the claimant does not disclose his identity to the GRC it may make it more difficult to look into the matter, to protect claimant's position or to give feedback.

Accordingly, while GRC will consider anonymous reports, they are not encouraged. If the claimant does insist on raising a concern anonymously, he will need to provide sufficient facts and data to enable the investigative team to look into the matter without his assistance.

Table 8-2: Grievance Resolution Process

Steps	Action level	Process
Step 1	Contract agreement	When during the contract discussion any grievances arise, solutions acceptable to both RD RAP Team and the APs will be sought. If any aggrieved AP is not satisfied with the solutions, the next option will be to lodge grievances to the GRC.
Step 2	GRC Resolution	<p>If the grievance is not solved at the previous level, the RAP Team will assist the aggrieved APs to formally lodge the grievances with the respective GRC. The aggrieved APs must lodge the complaint within 1 week of failure of negotiation at village level and produce documents supporting his/her claim.</p> <p>The GRC member secretary will review the complaint and prepare a Case File for GRC hearing and resolution. A formal hearing will be held with the GRC at a date fixed by the GRC member secretary in consultation with and the aggrieved APs.</p> <p>On the date of hearing, the aggrieved AP will appear before the GRC at the Gangeoba office and produce proof in support of his/her claim. The member secretary will note down the statements of the complainant and document all proof.</p> <p>The decisions from majority of the members will be considered final from the GRC and will be issued by the Convenor and signed by other members of the GRC. The case record will be updated and the decision will be communicated to the complainant AP by the RAP Team at the village level.</p>
Step 3	Decision from central RDMRDI	If any aggrieved AP is unsatisfied with the GRC decision, the next option will be to lodge grievances to the Working Group of RU at RDMRDI at the national level within 2 weeks after receiving the decision from GRC. The complainants, must produce documents supporting his/her claim. The Working Group will review the GRC hearing records and convey its decisions to the aggrieved APs within 2 weeks after receiving the complaint.
Step 4	Decision from court	<p>If the grievance redress system fails to satisfy the aggrieved APs, they can pursue further action by submitting their case to the appropriate court of law (Rayon Court).</p> <p>In case, if the ruling by the court is below the market price assessed through the open market survey earlier, RDMRDI will provide additional funds to ensure that compensation provided reflects full replacement cost.</p>

8.2 Mitigation Measures: Operation Stage

8.2.1 Generation of Solid Waste

Solid waste will be generated during operation of Gurjaani-Bakurtsikhe road from regular road maintenance works and from littering by road users. RD and Local Municipalities will be responsible for road maintenance and shall not dump or leave unattended at the roadside small amounts of waste that may remain from pothole patching, cleaning of drainage systems, trimming of vegetation or any other type of activity along the road. Waste must be disposed to a formal landfill in agreement with the Solid Waste Management Company. Periodic collection of roadside trash should be part of routine road maintenance service. If any locations on the road stand out by the number of accidents with large wild mammals or domestic animals, then relevant warning signs for traffic should be installed.

8.2.2 Pollution from Storm Water Runoff

Surface and ground water pollution from the operation of highway may occur from regular operational and maintenance as well as from traffic accidents involving cargo vehicles transporting hazardous substances. Drainage infrastructure should be arranged the way disallowing direct release of collected storm water to surface water bodies and should be kept in good functional condition throughout operation of the road.

The risk of accidents will be brought to the possible minimum by application of road safety measures. The World Bank-financed program of assistance to RD delivered through several ongoing projects includes technical assistance with the implementation of Road Safety Action Plan 2016-2021, which will enhance safety of operation of roads network throughout the country. Nonetheless, accidents involving cargo vehicles cannot be completely excluded and RD will maintain the already existing emergency response system for rapid response. This includes presence of an in-house emergency road maintenance unit within the institutional set-up of RD. This unit is well equipped and trained for addressing emergency situations on roads 24/7. Methodology used by the unit for addressing liquid spills on the roads is placement of absorbents on top of spills on the road surface and in drainage ditches, and consequent dry removal of saturated absorbent for disposal at formal sanitary landfills.

8.2.3 Noise and Vibration

During construction, the potential sources of noise are due to operation of construction related vehicular traffic, earth moving equipment, heavy machinery, and pile driving activities can generate high noise and vibration levels. Noise and vibration will have impact on people, fauna, livestock and natural environment.

Acoustic enclosures around the pile drivers will reduce the noise levels by 60 decibels and are strongly recommended. Regular maintenance of construction equipment and vehicles in accordance with manufacturers' maintenance procedures will greatly reduce the noise levels. Contractors are recommended to monitor the noise levels regularly at the construction sites and take necessary measures to comply with the national standards. High efficiency mufflers are to be fitted to the noise generating equipment. The construction related activities will be restricted between 06.00 to 21.00 hours within 150m of settlements and 500m from sensitive receptors.

Vibration impacts are expected to be felt only locally near construction sites and should not have any negative impacts on residents.

8.2.6 Air Quality

Air pollution: Regarding air pollution / ambient air quality the Project will have both positive and negative effects: benefits will generally result from improved traffic flow, which entails improved fuel efficiency and better engine performance, thereby reducing volume of vehicle emissions which otherwise result from bad road conditions.

In the medium to longer term, however, increasing traffic volumes will bring about higher noise levels and higher volumes of aerosol emissions, including lead and other solid particles, and also increased emissions of gaseous pollutants like NO_x and CO₂;

Residential quality: The road will be built according 80's avoiding previous receptors (i.e. local residents and road users). These receptors will be relieved from potential existing nuisances through vehicular emissions. Where the reconstructed road passes through settlements the impact on the quality of the living environment will be both positive and negative. The ultimate significance / magnitude of these impacts is determined by the following factors:

The Project routes already exist and rehabilitation will not affect a totally undisturbed receiving environment;

Design speed will be 40 to 80 km/h (depending on the individual location), which will generally entail comparably low levels of air pollution;

An improved road surface will allow for a smoother flow of traffic, which will have a direct positive impact on the levels of noise and air pollution generated per car; and

Due to the absence of significant polluting industries and the rural character of the receiving environment, existing levels air pollution from anthropogenic sources are assessed as minimal in the Project road's potential area of influence;

Negative impacts of air pollution by NO₂, CO and PM10 are negligible;

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

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

- Damping down using water browsers with spray bars or other technical means; Minimum 2 browsers will be required for that purpose. However, the constructing contractor should not be limited by this figure, and if required additional browsers should be engaged.
- Sheeting of construction materials and storage piles;
- Use of defined haulage routes and reductions in vehicle speed where required. Materials will be transported to site in off peak hours.
- Covering/wetting transported materials. Watering of construction site as appropriate. Providing protective equipment to workers as necessary.

9. PUBLIC CONSULTATION

Disclosure and public consultation on the present ESIA report will be conducted according to the World Bank policy and good international practice. Gurjaani-Bakirtsikhe road construction falls under Category B and requires conduct of at least one public consultation meeting on the draft ESIA report. Meanwhile, on February 23, 2014, a meeting with stakeholders was conducted in Gurjaani to inform public about the upcoming works and seek their input in determining the scope of the ESIA and design studies. During this meeting, the key issues raised by stakeholders were: threat of affecting vineyards, maximizing job opportunities for locals, and prevention of demolition of a shop at Bakurtsikhe roundabout

In order to address these concerns, the following actions were taken during the ESIA process:

1. to avoid vineyards alternative analyses were undertaken and new direction passing vineyards were rejected;
2. It was clarified that 70-80% of workforce will be selected from local residents and this will be written in the contract
3. to prevent destruction of shop at Bakurtsikhe roundabout, it was decided to make small realignment at this section.

The present draft final ESIA report in Georgian and English languages will be posted on the web page of the RD, announcement of the meeting will be posted in local newspaper and at the municipality administration. Hard copies of the document will be available at the offices of affected local self-governments offices located within the bypass road area. RD will organize a public consultation meeting to discuss the final draft of ESIA report. Public Consultation meeting will take place in Gurjaani municipality. Members of the affected communities, including elected officials, as well as representatives of the local small and medium businesses will be invited to attend the meeting. Consultant will make a presentation to inform people about the likely impacts of the project and the way in which they will be mitigated, and to obtain their support to the measures as far as possible.

Minutes of public consultation process will be included in finalized ESIA report, and will be re-disclosed through the RD's web page and the World Bank's electronic database.

10. ENVIRONMENTAL MANAGEMENT PLAN

10.1 Institutional Framework for EMP Implementation

Information included in the EMP is based on the main findings outlined in every chapter of the ESIA report, i.e., all proposed mitigation and monitoring actions set to a timeline, specific responsibility assigned and follow up actions defined.

The EMP is presented in a table format and divided into three main parts, dealing with the physical environment, with the biological environment, and with the socio-economic and cultural environment. Each part is organized by development stages, i.e. pre-construction, construction and road operation.

The overall objective of the EMP is to bring the project into compliance with national environmental and social requirements and environmental and social policies of the World Bank.

EMP will be included into the bidding documents so that bidders can consider and incorporate their environmental responsibilities into their bid proposals. Later EMP becomes an integral part of a contract for the provision of works and is binding for implementation.

Works provider has to have in place Health and Safety plan and Emergency Response plan. Plan for managing of waste pre-existing in the road corridor is attached to this ESIA report. Contractor shall develop management plan for the waste and excess material to be generated during works. Compensatory tree planting (and other greening/reinstatement as required) plan may be produced at a later stage, once progress of works allows initiation of reinstatement within the road corridor.

10.2 Institutional Setup for EMP Implementation and Reporting

The RD of the MRDI is responsible for general oversight of environmental compliance of works through ensuring quality performance of the technical supervisor and of the contractor. RD will perform these functions through its Resettlement and Environment Division comprising twelve staff members with relevant education and professional skills, as well as the safeguards consultants with international experience hired for the technical supervision of operations. This in-house capacity will be supported by external individual consultants upon demand.

The supervisor of works commissioned by the RD will be charged with the responsibility to establish strong field presence in the project area and supervise the works. Along with ensuring consistency with the design and quality of works, the supervisor is mandated to track the implementation of the EMP by the contractor, reveal any deviations from the prescribed actions, and identify any environmental / social issues should they emerge at any stage of the works.

Works supervisor will be responsible for reporting to the RD on the environmental and social performance under the EWHCIP on monthly basis through including safeguard compliance section into the general reporting. Supporting photo material shall also be attached. RD will make monthly reports from the works supervisor available to the World Bank upon demand. Also, RD will include analytical sections on the EMP implementation and overall safeguard performance into the regular project progress reporting to the World Bank. This reporting will be based on the information received from the works supervisor, but should also reflect results of RD's own due diligence (quality control over the supervisor's work) and RD's assessment of supervisor's performance.

Table 10.1: Environmental Management Plan

Construction Phase

Activity	Potential Impact	Mitigation Measure	Cost of Mitigation	Responsibility for Mitigation	Responsibility for Monitoring
Site clearance	Cutting of grass and other herbaceous vegetation, cutting and removal of shrubs and tree felling activities.	<ul style="list-style-type: none"> • Identification of trees to be cut or replanted. During the construction of the bridges special attention shall be paid to the protection of the plant species along rivers. • Avoidance of cutting and damaging of the trees without any special need. Preservation of vegetation as far as feasible. • Each removed tree shall be compensated by planting and maintaining 3 trees of the same species nearby or after completion of works and re-cultivation of temporarily used sites. 	The cost will be determined on case by case basis with consideration of the type of the plant species removed.	Construction Contractor (CC)	Roads Department (RD)
Offsite traffic	Impact on vegetation and soil	Strict keeping to the boundaries of the traffic route to avoid 'extra' damage of vegetation (if any) and soil ramming	No cost	CC	RD
Establishment and operation of contractor's work camps, equipment yard	Impact on vegetation and inadequate use of land resources	<ul style="list-style-type: none"> • Keeping to the boundaries of plots allocated for the project. • Arranging camp facilities with consideration of environmental safety requirements • After completing the works rehabilitation measures shall be taken to restore the access roads and other units (construction camps, storage territories, etc.) to the state that they were in before launching the project. By approbation of the local authorities the temporary roads can be left for the use of the local communities. 	<ul style="list-style-type: none"> • Cost of re-vegetation will depend on location of site allocated for the camp and auxiliary facilities. • The cost for planting and maintenance of a tree is estimated as 7\$ per unit 	CC	RD
Establishment and operation of contractor's work camps	Water and soil pollution, uncontrolled spillage of the waste water and waters polluted with mineral oils.	<ul style="list-style-type: none"> • Control the waste water of the temporary construction units to avoid their possible impacts upon the surface water. The waste water shall be collected in the septic tanks/pits. The tanks/pits emptied – waste disposed under agreement of local municipality. • Fuel/oil tanks shall be surround with watertight material (it is possible to use clay for the purpose). Storage site arranged at least 100 m distance from the riverbed. The area under the reservoirs/inside the ricks shall also be covered with waterproof material. Any spill should be immediately isolated and cleaned up with absorbent materials. • Onsite fueling must be avoided. If onsite fueling is required, this is to be done in the area arranged according to the requirements of pollution prevention plan. The designated areas for on-site fueling must be located away from drainage channels. • Regularly checking of vehicles/machinery for leaks. All leaks shall be immediately repaired. Incoming vehicles and equipment shall be checked for leaks. Leaking vehicles/ equipment shall not be allowed on-site. • Secondary containment devices drip pans or absorbent materials shall be provided. On small spills absorbent materials must be used. • Materials and waste must be stockpiled so as to avoid erosion and washing off into the river. Drainage trenches must be established to divert surface runoff from the site. • Waste collection area must be sited in order to avoid substantial amount of run-off from upland areas without draining directly to a water body. • If there is a risk of fuel/oil spills, an oil trap should be additionally provided. • To prevent runoff contamination, paving should be performed only in dry weather. • Staff should be briefed in sound material/fuel/waste management 	<ul style="list-style-type: none"> • The costs will be estimated by contractor identified through tendering. 	CC	RD

Earthworks and various construction activities	Soil stability and quality degradation, deterioration of the soil structure and reducing its productivity.	<ul style="list-style-type: none"> • Removal of topsoil prior to construction • Maintaining the humus topsoil deposited along the RoW corridor in a stable state prior to reuse. • Separate stockpiling of top and subsoil. • Strict keeping to the boundaries of the access roads and operation grounds to avoid pollution, ramming of soil. • Preservation of vegetation as far as feasible to avoid the risk of erosion • Avoidance of fuel/oil spills • Briefing staff in good practice • Hydroseeding 	No extra costs required. Will be done within the budget of construction works.	CC	RD
Establishment and operation of contractor's work camps and various construction activities	Safety of workers, operators and drivers.	<ul style="list-style-type: none"> • Providing detailed information to the personnel about the activities fore- seen in the project. • Holding trainings upon the safety of activities carried out by specialists in different fields • Briefing of new staff • Safety briefing prior to the shift start • Providing the personnel with personal protective equipment. • Checking the safety skills of the technical staff (drivers, etc.). • Preparation of a health and safety plan governing all activities on site. 	<ul style="list-style-type: none"> • No extra costs required. Will be done within the budget of construction works 	CC	RD
Bridge, culvert and drainage system construction; construction of bank protection facility	Possible deterioration of water quality, impacts upon water habitats caused by the works carried out in the river-beds. Impacts on the banks caused by activating erosion processes	<ul style="list-style-type: none"> • Earthworks necessary for the construction of the bridge piers and abutments shall be kept to the minimum practicable according to the design in order to avoid erosion. • Building temporary access roads having taken into consideration existing extent of erosion. • Examining the river banks and their neighboring slopes for potential sliding of soils. The aim of the examination is to rehabilitate and consolidate the banks in time. • Reducing the time necessary for the construction of the bridge piers and abutments to its optimal minimum. • Avoidance of stockpiling the material removed from the trenches into the river-beds. • Prohibition of vehicle/car maintenance, onsite fueling near the riverbed. • Proper management of waste • Stabilisation of slopes • Timing construction works in the riverbed with consideration of periods sensitive for aquatic life. Construction works in the rivers shall not coincide with the spawning season (preferably in autumn). • Prohibition of direct discharge of waste water into the rivers. • Arranging water-ways and canals for fish-passes during temporary shifts of the natural river-beds necessary for the construction works carried out in the river-beds. • Briefing staff in good practice 	<ul style="list-style-type: none"> • No extra costs required 	CC	RD
Operation of equipment maintenance and fuel storage areas	Deterioration of water/soil quality in the rivers caused by possible spillage of polluted waters, mineral oils or other contaminants.	<ul style="list-style-type: none"> • Establishing control to avoid re-fueling the vehicles and technical equipment in the river-beds, on the terraces and in their immediate vicinity and hence uncontrolled emergency spillage. • Control of the proper status of technical maintenance of vehicles/building machinery (pipes for hydraulic fluid, fuel tanks, etc shall be daily checked before the machinery comes into the rivers). • Usage of off-site vehicle wash racks or commercial washing facilities is preferable. If on-site cleaning is required, bermed wash areas for cleaning activities must be established. The wash area may be sloped to facilitate collection of wash water and evaporative drying. • Onsite repairs /maintenance activities should be limited. Priority should be given to offsite commercial facilities. If impossible, a designated area and/or a secondary containment for possible spills for on-site repair or maintenance activities must be provided. These areas shall 	No extra costs required. The costs for arrangement of wash area (as appropriate) will be estimated by contractor	CC	RD

		<p>be located away from drainage channels.</p> <ul style="list-style-type: none"> • Machinery/vehicles must not be fueled or maintained near the riverbed (distance between the maintenance site and the river should be at least 100 m). • Briefing staff in good practice 			
Earthworks and various construction activities	Landscape disturbance.	Before launching the works with regard to possible changes of the landscape a landscape harmonization plan shall be worked out and approved by Employer.	<ul style="list-style-type: none"> • No extra costs required. 	CC	RD
Earthworks and various construction activities	Archaeological chance finds	<ul style="list-style-type: none"> • Supervision by an archaeologist to avoid impact • In the event of unexpected discovery of archaeological objects during construction operations the Contractor shall put all activity on hold and immediately inform the client. • Resume works upon written notice of the client. 	<ul style="list-style-type: none"> • Cost of archaeological examination 	CC	RD
Earthworks and various construction activities	Air pollution from improper maintenance of equipment	<ul style="list-style-type: none"> • Maintain construction equipment to good standard; improper functioning machinery that causes excessive pollution will be banned from the construction sites. • Speed limit for offsite traffic. 	<ul style="list-style-type: none"> • No extra costs required 	CC	RD
Reinforced concrete mixing	Dust/air pollution from concrete mixing	<ul style="list-style-type: none"> • Mixing equipment should be well sealed; vibrating equipment should be equipped with dust-remove device. • Keep at least 300 m distance from residences windward wind direction to reinforced concrete production plants. 	No extra costs required.	CC	RD
Earthworks, storage and transportation of soil or other fine-grained materials (cement, sand, etc.), vehicles moving across unpaved or dusty surfaces.	Dust/air pollution	<ul style="list-style-type: none"> • Spray all unpaved roads and significant areas of uncovered soil with water every four hours on working days, during dry and windy weather; • Provide a wheel-washing facility and ensure that it is used by all vehicles before leaving all sites. • Cover all loose material with tarpaulins when transported off-site on trucks; • Cover all material stockpiled on site with securely-held tarpaulins at all times; 	The costs for arrangement of wheel-washing facility will be estimated by Contractor. No other costs required.	CC	RD
Earthworks and various construction activities	Impacts upon the human beings and natural receptors caused by increased noise levels.	<p>In the vicinity of settlements material transport and working hours will be restricted to between 07 to 21 hours within a 500 m distance of the adjoining settlements.</p> <ul style="list-style-type: none"> • Speed limit set for the offsite traffic. • Implementation of regular technical check-ups of mobile and stationary devices. 	No extra costs required.	CC	RD
Construction of the road and structures, , demolition of the road-side facilities	Non-hazardous waste production from construction and demolition Hazardous waste	<ul style="list-style-type: none"> • Development and implementation of waste management plan • For temporary disposal of inert waste the site within the camp/operation ground must be selected. The waste must be placed so as not to interfere with free movement of machinery and staff, away from surface water (within at least 100 m). Waste must be source-separated in order to ensure efficient management and enable reuse. • Any waste materials that may be used for the project must be reused on the site, or for the needs of municipality based on agreement, the rest should be disposed at the nearest landfill, as the case may be, under agreement of local authorities. • Briefing staff in good practice • Briefing of the staff in hazardous waste management 	No extra costs other than that related to removal of the waste from the site by waste removal service (under the contract) - required.	CC	RD
Operation of equipment	Hazardous waste	<ul style="list-style-type: none"> • Implementation of waste management plan • Hazardous waste containers shall have secondary containment and the waste shall not 	No extra costs other than that related to	CC	RD

maintenance, fuel storage areas, various construction activities	production from accidental spills, maintenance of the machinery, etc. (oils, solvents, oily rags, used filters, etc.)	<p>be mixed with recyclable inert material.</p> <ul style="list-style-type: none"> • Hazardous waste must be handled separately from inert one. • Disposal must be done with consideration of the waste type with relevant safety measures in place. • Temporary disposal site must be agreed with relevant authorities • Waste oil to be carried to the closes recycling facility under the contract • The staff involved in waste handling, in particular in hazardous waste management, should receive adequate training in waste management and safety. • Used tires can be transferred to Heidelberg Cement enterprise, for use as fuel, based on agreement with the company's leadership or to other company authorized for waste tires utilization 	removal of the waste from the site by waste removal service (under the contract) - required.		
Establishment and operation of construction sites/camps	Production of non-hazardous domestic waste (food waste, packaging, plastic bottles, etc.)	<ul style="list-style-type: none"> • Development and implementation of waste management plan • Waste must be collected in waste containers fitted with lids to prevent scattering by wind, odor pollution and attraction of scavengers. The lid will also protect the waste from rain/snow. The containers should be located in a predefined area, remote from water bodies and away from traffic. • Briefing staff in good practice 	No extra costs other than that related to removal of the waste from the site by waste removal service (under the contract) - required.	CC	RD
Various construction activities	Impacts on fauna (accidental deaths, reduction, loss or isolation of habitats, etc.)	<ul style="list-style-type: none"> • Trenches or pits, if made, should be fenced or protected to avoid entrapping and injuries of the fauna species. If, despite of the mentioned precautions, small animals turn to be entrapped, upon completion of the shift, planks or medium size twigs must be made available for the animals to escape from the pits/trenches after the night. Pits and trenches must be checked prior to filling up; • Special attention should be given to the avian fauna in the spring-summer (April to July), the season most sensitive for birds; • Construction in/near the riverbed should be avoided in the fish spawning season. • Briefing staff in good practice 	No extra costs required	CC	RD
Earthworks and various construction activities	Erosion, etc.	<ul style="list-style-type: none"> • Selection of a reasonable embankment height and stabilization of slopes; • Use of wooden shields for pits if they are very deep to preserve stability, as the case may be during the bridge construction; • Establishment of temporary berms, slope drains, temporary pipes, contour ditches, ditch checks, diversions, sediment traps etc. • Briefing staff in good practice 	No extra costs required. Will be covered by construction works budget.	CC	RD
Mobilization, construction	Loss of land, loss of businesses /income, restriction of access to river; impact on safety, noise and dust impact.	<ul style="list-style-type: none"> • Development and implementation of Land acquisition and resettlement plan • Implementation of noise, emission mitigation measures, • Temporary employment 	Land acquisition costs	CC	RD

Operation Phase

Activity	Potential Impact	Mitigation Measure	Cost of Mitigation	Responsibility for Mitigation	Responsibility for Monitoring
Accidental fuel/oil spill and/or roadside litter washed off/blown off into the river	Water pollution	<ul style="list-style-type: none"> Surface sweeping and the development of better cleaning methods; Control over truck traffic to minimize spills; Culverts must be cleaned routinely, and repaired as far as required. 	No extra cost - included into the contract cost of the maintenance company	Selected Maintenance Company /Emergency Management Agency	RD
Road resurfacing	Water bodies pollution by heavy metals, hydrocarbons and debris	<ul style="list-style-type: none"> Maintenance paving should be performed only in dry weather to prevent runoff contamination. Proper staging techniques should be used to reduce the spread of paving materials during the repair of potholes and worn pavement. These can include covering storm drain inlets and manholes during paving operations, using erosion and sediment controls to decrease runoff from repair sites, and using drip pans, absorbent materials and other pollution prevention materials to limit leaks of paving materials and fluids from paving machines. 	No extra costs	Selected Maintenance Company	RD
Transport emissions	Air pollution by transport emissions	Keep greenery near settled areas	No extra cost - included into the contract cost of the maintenance company	Selected Maintenance Company, Traffic Police,	Traffic Police, RD
Noise	Impacts upon the human beings and natural receptors caused by increased noise levels.	To protect residents along the road section from negative noise impacts noise mitigation measures should be applied - traffic velocity decrease in those sections where the noise limits are exceeded.	No extra cost	Selected Maintenance Company, Traffic Police	Traffic Police, RD
Littering	Possible negative impact on wildlife, water pollution	<ul style="list-style-type: none"> Ensure that the community is aware of the range ways to dispose of their waste correctly; Inform the community of the level of fines that littering incurs; Signage may be an element of a roadside litter prevention program, educating the community that littering is illegal, fines apply and behaviors are monitored. The signs may be suitable for placement in a series of two to four signs at 10 km intervals to repeat the message in different ways. 	No extra cost and included into the contract cost of the maintenance company	Selected Maintenance Company	RD
Condition of green buffers	Impact on vegetation Road kills of animals	<ul style="list-style-type: none"> Removal of faded plants and re-plating. Status of plants Keep records of accidents. If accident hot spots with large mammals are identified, appropriate protective measures shall be elaborated (e.g. reflectors /local fencing, warning signs, speed reduction etc.) 	No extra costs – covered by maintenance budget	Selected Maintenance Company	RD
Traffic	Incidence of accidents due to winter typical hazards (snow, ice, fog)	Installation of warning signs Informing	Low cost	Selected Maintenance Company, Emergency Management Agency, Traffic Police	RD
Presence of the road structure, traffic redirection	Restricted access because of the presence of the road, restricted access to the river; safety issues, impact on non-motorized transport	Smooth operation of underpasses, overpasses, road junctions, and secondary roads within the highway area	No extra costs – covered by maintenance budget	Selected Maintenance Company	RD

TABLE 10.2: MONITORING PLAN

Construction Phase

Activity	What (Is the parameter to be monitored?)	Where (Is the parameter to be monitored?)	How (Is the parameter to be monitored?)	When (Define the frequency / or continuous?)	Why (Is the parameter being monitored?)	Who (Is responsible for monitoring?)
Supply of construction materials	Purchase of the construction materials from licensed providers	Offices and warehouses of material suppliers, and borrowing sites	Checking documents; Inspection of material quality	In the process of signing the agreements for material provision	Ensure technical quality of construction; Protect human health and environment	RD
Transportation of construction materials and waste Movement of construction equipment	Technical condition of construction vehicles and machinery; Adequacy of the loading trucks for transported types of cargo, and canopy coverage of cargo transported in open trucks; Movement of construction vehicles and machinery along pre-defined routes.	Routes for transportation of construction materials and construction wastes	Inspection of roads adjacent to the construction site and included in the agreed-upon routes of transportation	Unannounced checks during the working hours	Avoid air and road pollution eith dust and solid matter; Reduce traffic disruption	RD Traffic Police
Operation of Construction machinery on site	Proper technical condition of construction machinery: <ul style="list-style-type: none"> • no excessive exhaust, • no fuel leakage, • respect of working hours 	Construction site	Inspection	Within and off working hours	Reduce air and soil pollution caused by equipment operation; Reduce noise and dust nuisance to local population	RD

<p>Servicing of construction machinery</p>	<p>Washing vehicles and machinery off-site of in the location sufficiently distant from water bodies;</p> <p>Servicing vehicles and machinery with oils and lubricants off-site or in an especially arranged location on-site;</p> <p>technical adequacy of the servicing location:</p> <ul style="list-style-type: none"> • solid, insulating floor or adsorbent layer (sand, gravel, membrane), • containment barriers allowing enough space for holding fuel over the maximum amount expected on the location at a time, • emergency fire-fighting kit, • sedimentation pool at car wash area. 	<p>Construction site and construction base (if applicable)</p>	<p>Inspection</p>	<p>Entire period of machinery operation</p>	<p>Avoid land and water pollution with oil products due to servicing of vehicles and machinery;</p> <p>Be ready for fire emergency action to promptly localize fire source and minimize material damage</p>	<p>RD</p>
<p>Extraction of inert material</p>	<p>Purchase of inert material from the existing providers if possible;</p> <p>Obtaining license for extraction of material by the Contractor and strict adherence to the terms of such license;</p> <p>Terrace processing of the borrow pits, backfilling of excess material, and</p>	<p>Borrow areas</p>	<p>Checking documents</p> <p>Inspection of activities</p>	<p>The period of material extraction</p>	<p>Reduce slope erosion and damage to the ecosystem and landscape;</p> <p>Reduce river bank erosion, water pollution with suspended particles, and impact on the aquatic life;</p>	<p>RD</p> <p>National Environment Agency</p>

	<p>harmonization with landscape;</p> <p>River bed gravel extraction away from water flow, arrangement of gravel barriers for isolating extraction area from water flow, prevention of water flow entry by vehicles and machinery;</p> <p>Demarcation of borrow areas with warning signs</p>				Protection of animals and people from accidents	
Generation of construction waste	<p>Temporary storage of inert and hazardous wastes separately at the designated locations;</p> <p>Timely disposal of waste to the formally designated landfills;</p> <p>Hand-over of hazardous wastes to licensed deactivating and processing companies.</p>	<p>Construction site and base (if applicable);</p> <p>Locations designated for waste disposal</p>	<p>Checking documents;</p> <p>Visual observation</p>	Entire period of construction	Avoid pollution of the environment	<p>RD</p> <p>Local Municipality</p>
Accumulation of household waste	<p>Provision of waste containers on-site;</p> <p>Agreement with local municipality for regular out-transporting of waste</p>	Construction site and base (if applicable)	Visual inspection	Entire period of construction	Avoid pollution of soil and water with household waste	<p>RD</p> <p>Local Municipality</p>
Generation of liquid waste	Arrangement and operation of toilets compliant with sanitary norms on-site;	Construction site and base (if applicable)	Visual inspection	Entire period of construction	Avoid flooding of construction site and base;	RD

	<p>Arrangement of drainage system for storm water collection and periodic cleaning of the system from silt;</p> <p>Arrangement of sedimentation pool for waste water collection on-site</p>			Increased frequency of inspection in periods of high precipitation	Reduce pollution of surface and ground water	
Operation of asphalt-concrete plant	<p>Obtaining permit for impacting environment by Contractor and strict adherence to its terms;</p> <p>Placement of plant in the location permissible for minimal disturbance of local population;</p> <p>Arranging sedimentation pool for capturing of liquid discharges from plant</p>	Construction site and base (if applicable)	<p>Checking documents</p> <p>Inspection</p>	Before establishment of plant and during entire period of its operation	<p>Reduce inconvenience for local population due to plant operation;</p> <p>Reduce air and surface water pollution from emissions and discharges from plant</p>	<p>RD</p> <p>Environment Protection Agency</p>
Safety of labor	<p>- provision of Special Clothes and protective means for the contractors</p> <p>- Consistency with the rules of exploitation of the construction equipment and usage of private safety means</p>	Construction site	Inspection of the activities	the whole construction period	reduce the probability of accidents	RD

Operation Phase

Activity	What (Is the parameter to be monitored?)	Where (Is the parameter to be monitored?)	How (Is the parameter to be monitored?)	When (Define the frequency / or continuous?)	Why (Is the parameter being monitored?)	Who (Is responsible for monitoring?)
Cleaning road surface and shoulders from waste	Trash deposited from moving vehicles timely collected and removed; Bodies of animals overrun by vehicles timely collected and removed	Carriageway and shoulders of the road section	Inspection	Quarterly	Prevent road littering; Road safety	Local municipality
Keeping road drainage system operational	Periodic cleaning of drainageditches from silt and trash	Drainage system long the road section	Inspection	Quarterly	Maintaining drainage system capacity for preventing road flooding and water damage	Local municipality
Confinement of accidental spills and clean-up	Timely confinement, deactivation, and removal of liquid or powder spills of cargo in case of road accidents	On the road and its immediate surroundings	Inspection	Upon occurrence of accidents, as required	Prevent pollution of soil and water	Traffic Police; Local municipality
Disposal of waste from regular road maintenance works	Collection and timely disposal of waste from maintenance works to the designated landfill	On the road and its immediate surroundings	Inspection	Towards completion of scheduled maintenance works	Prevent environment pollution	Local municipality

ANNEX 1 - WASTE MANAGEMENT PLAN

(Bakurtsikhe-Gurjaani Road Construction)

Definitions

Asbestos means the asbestiform varieties of: Chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonitegrunerite); anthophyllite; tremolite; and actinolite.

Asbestos-containing material (ACM) means any material or product which contains more than 1 percent asbestos.

Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a school building.

Asbestos debris means pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.

Airborne Asbestos Fibers Any material that contains greater than one percent asbestos, and which can be crumbled, pulverized, or reduced to powder by hand pressure. This may also include previously non friable material that becomes broken or damaged.

Abbreviations

ACM	Asbestos-Containing Material
ACBM	Asbestos-Containing Building Material
GIIP	Good International Industry Practice
EHS	Environmental Health & Safety
EMP	Environmental Management Plan
EA	Executive Agency
ILO	International Labor Organization
MENRP	Ministry of Environmental and Nature Resource Protection of Georgia
RD	Roads Department of Georgia
WBG	World Bank Group

1. Introduction

Different types of waste along short sections on the both sides of the ground road in the area adjacent to a 6-km-long section of Bakurtsikhe-Gurjaani road are disposed in an uncontrolled manner. This waste was originated as a result of the residential and commercial buildings, as well as infrastructural buildings damaged during the flood in 2012 in Kakheti region. The total amount of the waste found in the area adjacent to the project zone is approximately 35-40 m³.

Prior to commencement of the preparatory works within the scope of the project, the project area must be cleaned off the said waste, which is to be collected, transported and disposed on the nearest landfill.

The following actions are necessary to manage the waste found in the project zone:

1. The amount and content of the waste is to be identified;
2. The waste management plan is to be developed;
3. The company with relevant resources (both, human and infrastructural) is to be identified;
4. The waste is to be removed from the area and safely disposed under the prepared plan.

2. Waste content

Aiming at identifying the amount and content of the waste, a trip to the project zone was organized on September 10 and 11 of 2014. As already mentioned, as per the preliminary information, the primary source of the waste origination is the materials of the damaged buildings and premises during the flood. As the local population stated, the facts of throwing the construction and municipal waste into the existing waste are frequent.

As the visual observation evidenced, the waste in the given area is construction and municipal one. No organic waste is found in the area. This can be explained by the cattle of the nearby villages using the project zone as a drive and eating any organic remains found in the area (Figures 1 and 2).

Figures 1 and 2: Driving the cattle across the project zone



An evidence of the sellable waste presumably chosen (separated) out of the total waste volume by the locals was clearly seen in the project zone (Figures 3 and 4).

Figures 3 and 4: Plastic and glass bottles placed separately



Most of the waste in the said area belongs to a non-hazardous type of waste. However, even visually it can be seen that 10-15% of the total waste in the area (approximately 5-6 m³) is asbestos-containing waste, in particular, asbestos sheeting. This type of waste belongs to the highly hazardous waste.

It should also be noted that the asbestos-containing waste was allocated as a small fill (Figures 5 and 6), as well as asbestos-containing fractures of the sheeting mixed with different kinds of waste (Figures 7 and 8).

Figures 5 and 6: Asbestos-containing waste placed as a separate pile



Figures 7 and 8: Small asbestos-containing waste mixed with different kinds of waste



Following the high hazardous nature of the asbestos-containing waste, prior to collecting and removing the waste from the project area, it should be separated (isolated) from other types of waste.

The visual observation also revealed minor quantities of other waste in the project area, mostly the broken-down parts, polluted with fuel or oil materials (Figures 9 and 10). However, as already mentioned, their quantity is minor making 1% of all waste according to the preliminary data.

Figures 9 and 10: Broken-down vehicle parts



During the field works, aiming at avoiding extra hazard, the radiation background of the waste was determined. The measurements were done with device "Redex". The radiation background all over the project area was within the norm, varying between 10 and 14 R/hr. A little increased radiation background was fixed in the small areas with clay remains making 22 R/hr (Figures 11 and 12).

Figures 11 and 12: Background radiation in the project area



3. Legislative Requirements

3.1. Georgian Legislation

The hygienic requirements, sanitary rules and standards related to asbestos and ACM (asbestos-containing materials) on the territory of Georgia are regulated by Decree No. 2004 of the Minister of Labor, Health and Social Affairs of Georgia “**The hygienic requirements for the sanitary rules and standards for asbestos and asbestos-containing materials**”.

The said law regulates packing, storing and transportation of the asbestos-containing materials, as well as collecting, storing and utilization processes of asbestos-containing industrial and municipal waste.

The maximum admissible concentrations of fibrous aerosols with diverse actions and metals in the working zone is regulated by Decree No. 262/N of September 18, 2002 of the Minister of Labor, Health and Social Affairs of Georgia.

In line with the said law, the ACMs belong to the class of highly hazardous substances.

3.2 World Bank Group Approach to Asbestos Health Risk

The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP)⁵. When one or more members of the WBG are involved in a project, the EHS Guidelines are applied as required by their respective policies and standards.

⁵ Defined as the exercise of professional skill, diligence, prudence, and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility

The WBG's EHS Guidelines⁶ specify that the use of ACM should be avoided in new buildings and construction or as a new material in remodeling or renovation activities. Existing facilities with ACM should develop an asbestos management plan that clearly identifies the locations where the ACM is present, its condition (e.g., whether it is in friable form or has the potential to release fibers), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities. Repair or removal and disposal of existing ACM in buildings should be performed only by specially trained personnel⁷ following host country requirements or, if the country does not have its own requirements, internationally recognized procedures⁸. Decommissioning sites may also pose a risk of exposure to asbestos that should be prevented by using specially trained personnel to identify and carefully remove asbestos insulation and structural building elements before dismantling or demolition⁹.

3.3 International Convention and Standards for Working with Asbestos

The International Labor Organization (ILO) established an Asbestos Convention (C162) in 1986 to promote national laws and regulations for the "prevention and control of, and protection of workers against, health hazards due to occupational exposure to asbestos."¹⁰ The convention outlines aspects of best practice: Scope and Definitions, General Principles, Protective and Preventive Measures, Surveillance of the Working Environment, and Workers' Health. As of March 4, 2008, 31 countries had ratified the Convention;¹¹ 17 of them have banned asbestos.

Some of the ILO asbestos convention requirements:

- work clothing to be provided by employers;
- double changing rooms and wash facilities to prevent dust from going home on street clothes;
- training of workers about the health hazards to themselves and their families;
- periodic medical examinations of workers,
- periodic air monitoring of the work environment, with records retained for 30 years;
- development of a work plan prior to demolition work, to protect workers and provide for proper waste disposal; and

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[http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/\\$FILE/Final+-+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf) (pp. 71, 91, 94)

⁷ Training of specialized personnel and the maintenance and removal methods applied should be equivalent to those required under applicable regulations in the United States and Europe (examples of North American training standards are available at: <http://www.osha.gov/SLTC/asbestos/training.html>)

⁸ The ASTM International E1368 - Standard Practice for Visual Inspection of Asbestos Abatement Projects; E2356 - Standard Practice for Comprehensive Building Asbestos Surveys; and E2394 - Standard Practice for Maintenance, Renovation and Repair of Installed Asbestos Cement Products.

⁹ [http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/\\$FILE/Final+-+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf) (pp. 71, 91, 94)

¹⁰ www.ilo.org/ilolex

¹¹ <http://www.ilo.org/ilolex/english/convdisp1.htm>

- protection from “retaliatory and disciplinary measures” of workers who remove themselves from work that they are justified in believing presents a serious danger to health.

4. Risk Assessment

The asbestos risk assessment process involves identifying, analyzing, evaluating, controlling and monitoring sources of asbestos within buildings or other structures. The presence of asbestos within a building is considered a hazard, but the level of risk associated with the hazard is related to the presence of airborne fibers. The identification of asbestos within a building doesn't automatically necessitate its immediate removal. Asbestos that is in a stable matrix, or effectively encapsulated or sealed, and remains in a sound condition while left undisturbed, represents low risk to health.

Asbestos becomes dangerous when the fibers are released into the air and inhaled or ingested in high concentrations over a prolonged period of time. Individuals face the risk of inhaling or ingesting airborne fibers when asbestos containing products are worn down, disturbed, or damaged.

There are some classifications to determine the risk of the ACMs, but the principal evaluation indicators are the same with all of them. The degree of risk increases as a result of the following factors:

1. High degree of the physical damage of the ACMs.
2. High probability of the future damage of the ACMs.
3. High degree of contact of the damaged ACMs with air.

The ACMs located in an uncontrolled manner in the project zone, besides being virtually fractured, are subject to daily impact of the following factors:

1. The project road is the driving route for the cattle of the nearby villages (the cattle is driven across the project road twice a day). The cattle use the waste in the area as a feed. Consequently, the ACMs in question are subject to further impact every day.
2. The local population regularly separates the secondary used materials from the general waste in the area adjacent the project zone (these are mainly plastic and glass bottles). The risk of damage of the ACMs is quite high in this case, too.
3. The local population permanently dispose the waste in the said area in an uncontrolled manner what is another source of damage for the ACM.

As already mentioned, the area where the AC waste is placed, is an open area and is in direct contact with air.

Following the above-mentioned, the existing situation can be evaluated as highly risky. ACM is friable and not in a stable condition, and there is a risk to health, it must be removed by a certified asbestos removalist as soon as practicable.

Within the scope of the project, it is necessary to ensure the separation/collection, transportation and safe disposal of the AC waste by the Construction Contractor prior to the preparatory works.

5. Asbestos-Containing Material Management Plan

5.1 Goals and Objectives

The goal of the presented **Asbestos-Containing Material Management Plan** is to avoid, reduce or manage any potential adverse impact on the environment and/or humans caused by the project implementation.

In order to achieve this goal, the following measures are necessary:

- The quantity and content of the waste placed in the project zone in an uncontrolled manner is to be identified;
- The degree of risk of the negative impact of the existing situation on the environment is to be identified;
- A duly qualified, specialized and licensed organization will be hired by the contractor according to the Georgian legislation;
- A detailed „**Waste Asbestos-Containing Material Management Plan**“ is to be developed;
- The separation/collection, transportation and safe disposal of the AC waste is necessary;
- The monitoring plan is to be developed and implemented.

5.2 Rights and Responsibilities

The companies and organizations engaged in the AC waste have the following rights and obligations:

Executive Agency (Road Department):

- Approve AMP risk assessment and Waste ACM Management plans
- Ensure resources are allocated to enable thorough application of Debris ACM Management plan on site
- Ensure employees are made available for asbestos awareness training and asbestos removal work
- Ensure an Asbestos Removal Business Certificate is maintained for the site where applicable
- Ensure the Waste ACM Products Register is maintained for the site
- Ensure the Asbestos Exposure Register is maintained for the site
- Ensure compliance with Waste ACM Management plan

Contractors:

- Submit risk assessment and Waste ACM Management plans when performing waste separation (asbestos removal), transportation and disposal works;

- Develop a site-specific waste separation (asbestos removal) control plan prior to performing the separation works;
- Undergo site induction;
- Ensure no asbestos is removed or disturbed without prior notification to RD
- Ensure legislative requirements and appropriate procedures are complied with.
- Upon job completion ensure all products are labelled using the correct identification stickers and disposed in safe manner.
- Report immediately to RD any perceived asbestos risk

5.3 Awareness Training

5.3.1 Asbestos Separators/Removalists

Persons carrying out asbestos removal work are to be trained so they can carry out this work safely and without risk to their own health or the health of others. This training must reflect the specific type of asbestos work to be undertaken. Asbestos Separators/Removalists are to keep written records of all training provided to their asbestos removal workers and these records should be requested before awarding the contract for any site removal work.

5.3.2 Site employees

Any RD employees and others who may come into contact with ACM on the site, either directly or indirectly, must be provided with adequate information and training. Depending on the circumstances the asbestos awareness training may include:

- the purpose of the training;
- the health risks of asbestos;
- the types, uses and likely occurrence of ACM at the specific construction site;
- the trainees' roles and responsibilities under the project Waste ACM Management plan;
- where each site-specific register of ACM is located and how it can be accessed;
- the timetable for removal of ACM from the particular construction site;
- the processes and procedures to be followed to prevent exposure, including exposure from any accidental release of asbestos dust into the workplace;
- where applicable, the correct use of maintenance and control measures, protective equipment and work methods to minimize the risks from asbestos, limit the exposure of workers and limit the spread of asbestos fibers outside any asbestos work area;
- control levels for asbestos; and
- the purpose of any air monitoring or health surveillance that may occur.

5.3.3 Local population

The awareness building training about the negative impact of the AC waste on the environment should be held for the population living or working adjacent to the project zone. Depending on the circumstances the asbestos awareness training may include:

- the purpose of the training;
- the health risks of asbestos;
- the types, uses and likely occurrence of ACM at the specific construction site;
- where each site-specific register of ACM is located and how it can be accessed;
- the timetable for removal of ACM from the particular construction site;
- the processes and procedures to be followed to prevent exposure, including exposure from any accidental release of asbestos dust into the workplace;

5.4 Waste Separation

5.4.1 General requirements

Management of disaster debris and demolition waste resulting from floods, storms and similar events from all sources must be properly separated to remove problem materials if the bulk of the debris or waste is to be managed at appropriate solid waste facilities and/or to be recycled. Careful waste separation is essential to expedite disaster clean up and removals, hold down costs, reduce waste, and protect human health. Recycling certain materials will help hold down costs. Poorly separated waste or debris may not be managed as inert waste and may be subject to further waste evaluation and disposal costs as municipal waste, asbestos waste or even hazardous waste. Problem loads may be rejected and contractors may be asked to do additional work.

Wastes should be carefully separated into categories described below and properly managed at approved recycling, processing or disposal facilities in accordance with International, national and local requirements. Keep records on the amount removed from each unit, how it is segregated and eventually managed, recycled or disposed:

Electronic waste (E-Waste) including monitors, stereos, mercury devices and fluorescent lighting equipment such as thermostats, mercury switches, fluorescent fixtures and bulbs, light ballasts and similar materials. Please package fluorescent bulbs and other fragile materials to avoid breaking.

Hazardous waste includes, but is not limited to: paints, solvents, varnishes, stains, cleaners, degreasers, spot removers and similar ignitable products; aerosol cans, and compressed gas containers or cylinders; ammunition including unused shells, lead shot, bullets, powder loading supplies, etc.; oils, fuels, automotive additives, fluids (transmission, hydraulic, brake, etc.); batteries (including lead, mercury, ni-cd, etc.); acids and bases – often labeled corrosive (store acids separately from bases and do not mix!); toxics, poisons, pesticides (includes insect, rodent and weed killers); electronics (computers and screens, TVs, stereo equipment, etc.); mercury devices (switches, fluorescent lighting, mercury bulbs, thermometers, etc.); light ballasts and transformers;

antifreeze; fertilizers; and other ignitable, corrosive, reactive, toxic, pcb, problem or unknown wastes. Label containers and do not mix materials.

Medications and infectious waste including pills, medicines, dressings, needles, sharps, human blood or tissue, isolation waste, pathological waste, infectious human or animal waste, etc.

Asbestos-containing material from individual all sources may include asbestos pipe wrap, boiler coatings, loose insulation, transit (older cement type siding and electrical backing), vermiculite (light, platy insulating material) and other materials APPENDIX 1. SOME ALTERNATIVES TO ASBESTOS-CONTAINING PRODUCTS). Please label all bags or containers "Asbestos Waste." Asbestos Waste must be disposed at approved solid waste facilities.

5.4.2 Fencing the working area

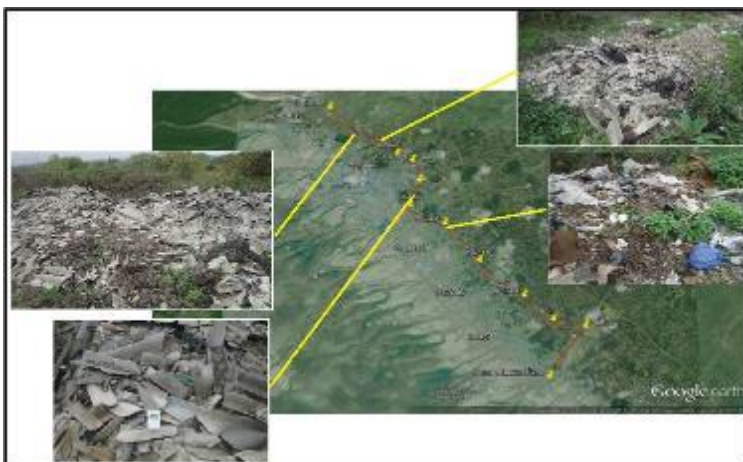
The ACM found in the project area is severely damaged and the degree of damage is increasing day after day following the existing surroundings. In addition, these materials are scattered in the open area creating the most favorable conditions for asbestos dust to originate and move to certain distances.

Consequently, any additional intervention by a human further boosts the risk of origination and movement of the asbestos dust to certain distances.

The preliminary study of the area revealed that adjacent to a 6-km-long project zone, the waste is distributed unevenly. The major proportion of the waste is concentrated in the western part of the project road, in the area adjacent to the city of Gurjaani. This can be explained by the fact that the remains were transported from Gurjaani side and aiming at economizing on petrol, the drivers emptied the trucks before reaching the destination.

The waste are scattered over about 3 km area (Figure 13). There is no discontinuous line of waste along the section, but the maximum length of such piles is 10 m and its width is 3 m. The height of the waste does not exceed 0.7 m.

Figure 13: Major points where ACMs are found



For safety reasons, aiming at avoiding the distribution of the asbestos dust originated in the process of separation, the area of the waste disposal must be divided into smaller areas and bordered with approximately 2-metre-high fences in the separation process. Plastic must be used as fences, as dust is easy to remove from it.

To the extent possible, the process of separation shall be started when the number of people is minimal in the project area.

Safety marks and signals shall be provided at the locations preventing foreign people from penetrating the area.

The works are inadmissible to accomplish in windy weather to prevent the asbestos dust from spreading.

All personnel participating in the separation and packing of the ACM shall have PPE, and all workers shall be equipped with respirators.

5.5 Personal Protective Equipment (PPE)

The PPE requirements for work involving ACM at construction sites are to be based on the relevant risk assessment conducted by a suitably qualified person. Section 9.7 and Appendix C of the Code of Practice for the Safe Removal of Asbestos [NOHSC: 2002(2005)] must be consulted to determine the PPE needs, as well as AS/NZS 1715 and AS/NZS 1716 for specific respiratory protection requirements. See NOHSC: 2002 (2005) Appendix C – Guide to the selection of respiratory protection.

Protective clothing and equipment is to be worn at all times during work in the asbestos work area, prior to the final clearance inspection. Any PPE worn during asbestos disposal is to be treated as asbestos waste and disposed of in the approved waste bags. The laundering of contaminated protective clothing in workers' homes is strictly prohibited.

The employees, who are obliged to use the respirators, should be proficient of the rules of their exploitation. The training programs and labor protection guidance of the employees engaged in the operations with asbestos should cover the following questions:

- (a) Surroundings when the use of respirators is necessary and the identification of such surroundings;
- (b) The rules of exploitation and examination of the respirator's close attachment to one's face;
- (c) The rules of the right functioning, examination and right storage of the respirator.

Prior to the removal/separation, the asbestos materials must be wetted. The removal works must be accomplished with cautious to avoid mechanical damage to the ACMs.

5.6 Packing Asbestos-Containing Materials

Asbestos waste, including contaminated PPE and cleaning materials (e.g. cleaning rags and plastic sheeting used to fencing the asbestos work area) are to be removed and disposed of into bags.

Loose asbestos waste is not to be allowed to accumulate within the asbestos work area. It must be collected and disposed of in asbestos waste bags and/or in a solid, sealable asbestos waste container, such as a bin or drum, as storage is required.

Controlled wetting of asbestos waste is to be done to reduce the possibility of dust emissions during the bagging or other containment of the waste. If asbestos waste cannot be disposed of immediately (e.g. because of volume requirements for disposal), it is to be stored in a solid waste drum, bin or container or skip and sealed and secured upon the completion of each day's work so that unauthorized access is prevented.

Waste Bags: - asbestos waste is to be collected in heavy-duty 200 µm (minimum thickness) polythene bags that are no more than 1,200 mm long and 900 mm wide. The bags are to be labeled

with an appropriate warning, clearly stating that they contain asbestos and that dust creation and inhalation should be avoided.

Asbestos should be packed and marked in tough, hermetic and dust-proof bags, with the marking or annotation about the safety with the following data:

- Name of the waste;
- Address of the product manufacturing company; chemical designation or common names of all components of the asbestos-containing production;
- Percentage ratio of asbestos in the mixture;
- Information about the asbestos properties dangerous for health;
- Indications about the necessity to use the PPE (respirators, protective clothing, etc.);

The bags should be hermetically closed with a thermal welded joint or stitched thread. In case of the damage to the bags, the damaged spots should be soldered with a joint tape, placed in the impermeable bags, sealed and marked.

5.7 Offsite Waste Disposal

All asbestos waste material shall be buried at an approved landfill site and in a manner approved by the local and state authorities. Prior to payment of invoices RD must receive copies of waste disposal receipts, as provided by the approved landfills. All details of offsite disposal are to be included in the asbestos removal control plan.

No building materials are to be re-used or recycled unless they have undergone full successful decontamination. If this can't be achieved then the building materials are to be treated as asbestos waste and disposed of accordingly. All waste disposals shall be recorded (date, quantity, disposal contract etc.) in an appropriate register (e.g. within the sites waste management plans for disposal of regulated wastes).

The waste unloaded on the landfill should be buried under at least 25-cm-thick soil layer. Leaving asbestos-containing waste open on the landfill is inadmissible. During the trench conservation, the final layer covering the asbestos-containing waste, should be at 2 m thick.

Letter from Solid Waste Management Company of Georgia" LTD



შპს საქართველოს მყარი ნარჩენების მართვის კომპანია
SOLID WASTE MANAGEMENT COMPANY OF GEORGIA LTD



N 04/537
31/12/2014

537-04-2-201412311245



რეგიონული გზების გაუმჯობესების პროექტის (KRRIP)

გარემოს დაცვის კონსულტანტს

ბატონ რევაზ ენუქიძეს

ბატონო რევაზ,

შპს „საქართველოს მყარი ნარჩენების მართვის კომპანია“ განიხილა თქვენი წერილი (30.12.2014) რომელიც ეხება რეგიონული გზების გაუმჯობესების პროექტის ფარგლებში დაგეგმილი, ზაკურციხე-გურჯაანის შემოვლითი 17 კმ-იანი გზის მიმდებარედ, უკონტროლო გადაწვრების მყარი მუნიციპალური ნარჩენების ნაგავსაყრელზე განთავსებას.

აღნიშნულ საკითხთან დაკავშირებით გაცნობებთ, რომ კომპანია შზად არის განათავსოს მყარი ნარჩენები მის ოურისდიქციაში არსებულ ნაგავსაყრელზე და გათავაზობთ ორ ალტერნატივას - წნორისა და ლაგოდეხის ნაგავსაყრელებს. დამატებით გაცნობებთ, რომ აზბესტის ან აზბესტმემცველი ნარჩენების ნაგავსაყრელზე უსაფრთხო განთავსება უნდა განხორციელდეს საჭირო პროცედურების დაცვით. აზბესტი მიეკუთვნება სახიფათო ნარჩენების კატეგორიას. შესაბამისად, აზბესტმემცველი ნარჩენების მფლობელის კომპეტენციასა და მისი სპეციალისტების პოლიეთილენის ტომრებში სველი წესით განთავსება და ნაგავსაყრელამდე ტრანსპორტირება.

თქვენს მიერ წერილში მითითებული შერეული ნარჩენების საგარეუდო რაოდენობა 35-40 მ³-ია. ხელშეკრულების გაფორმებამდე ნარჩენების რაოდენობა ინტერტულ-სამშენებლო და აზბესტმემცველი ნარჩენებისთვის წარმოდგენილი უნდა იყოს წონით ერთეულში, ხოლო საყოფაცხოვრებო ნარჩენების რაოდენობა შეგიძლიათ მიუთითოთ როგორც წონით, აგრეთვე მოცულობით. ნაგავსაყრელზე ნარჩენების განთავსებაზე მომსახურების საფასურს წარმოგიდგინებ დანართში.

პატივისცემით,

გიორგი მუხიშვილი

დირექტორი



N 8-მ

08/07/2014

ბ რ ძ ა ნ ე ბ ა

„შპს „საქართველოს მყარი ნარჩენების მართვის კომპანიის“ ხალხსზე არსებული მყარი საყოფაცხოვრებო ნარჩენების პოლიგონებზე იურიდიული და ფიზიკური პირების მიერ შეტანილი მყარი საყოფაცხოვრებო ნარჩენის, მათ შორის არასახიფათო და ზოგიერთი სახის სპეციფიური მყარი ნარჩენის (რომელთა მოგროვებაც არ მიეკუთვნება მუნიციპალიტეტების კომპეტენციას), განთავსებისა და მომსახურების საფასურის განსაზღვრის შესახებ“ შპს „საქართველოს მყარი ნარჩენების მართვის კომპანიის“ დირექტორის 2014 წლის 10 აპრილის N01-5/24 ბრძანებაში ცვლილების შეტანის შესახებ

საქართველოს ეკონომიკისა და მდგრადი განვითარების სამინისტროს 2012 წლის 24 აპრილის N1-1/1045 ბრძანებით დამტკიცებული შპს „საქართველოს მყარი ნარჩენების მართვის კომპანია“ (შემდგომში - კომპანია) წესდების №-3 მუხლის, მე-8 მუხლის მე-7 პუნქტის, კომპანიის სტრუქტურული ერთეულის - ეკონომიკური მართვის დეპარტამენტის 2014 წლის 07 ივლისის N210-04 მოხაზებითი ბარათისა და კომპანიის ხელმძღვანელი პირების ერთობლივი გადაწყვეტილების საფუძველზე.

ვ ბ რ ძ ა ნ ე ბ ა:

1. გაუქმდეს კომპანიის დირექტორის 2014 წლის 10 აპრილის N01-5/24 „შპს „საქართველოს მყარი ნარჩენების მართვის კომპანიის“ ხალხსზე არსებული მყარი საყოფაცხოვრებო ნარჩენების პოლიგონებზე იურიდიული და ფიზიკური პირების მიერ შეტანილი მყარი საყოფაცხოვრებო ნარჩენის, მათ შორის არასახიფათო და ზოგიერთი სახის სპეციფიური მყარი ნარჩენის (რომელთა მოგროვებაც არ მიეკუთვნება მუნიციპალიტეტების კომპეტენციას), განთავსებისა და მომსახურების საფასურის განსაზღვრის შესახებ“ ბრძანებაში - 2014 წლის 27 მაისის N1-ო ბრძანებით შეტანილი ცვლილებით დამტკიცებული დანართი და იგი დამტკიცდეს წინამდებარე ბრძანებაზე თანდართული სახით.

2. კონტროლს ბრძანების შესრულებაზე განვახორციელებ მირადად.
3. ბრძანება ძალაშია ხელმოწერისთანავე.

გიორგი მუსხიშვილი

დირექტორი

პარტი:

ეს "საქართველოს მყარი ნარჩენების მართვის კომპანიის" ხელნაწიხ არსებული მყარი საყოფაცხოვრებო ნარჩენების პოლიგონებზე ორნიდიული და ფიზიკური პირების მიერ შეტანილი მყარი საყოფაცხოვრებო ნარჩენის, მათ შორის არასახიფათო და ზოგიერთი სახის სპეციფიური მყარი ნარჩენის განთავსების მომსახურების გაწევის საფასური, ნარჩენების ახლების მხედვიით

№	ნარჩენების დასახელება	გასაწევი მომსახურების ღირებ. დღ-ს ჩაიფლით [ლარიტონსაში]	გასაწევი მომსახურების ღირებ. დღ-ს ჩაიფლით [ლარიტონსაში]
1	სამწებლო-ინერტული და მახთან გათანაბრებული ნარჩენი (მიწა, მიწანარევი, ინერტული მასალა და სხვა), მყარი ინერტული სამრეწველო ნარჩენი, რომელსაც არ გააჩნია ტოქსიკური ან რადიოაქტიური თვისებები და ფიზიკური დაზან იორიდიული პირების მიერ საწარმოებიდან წარმოქმნილი არასახიფათო მყარი ნარჩენი		
ა	100 ტ-ზე ნაკლები	12.00	
ბ	100 ტ-დან 1000 ტ-ის ჩაიფლით	10.00	
გ	1000 ტ-ზე მეტი	8.00	
2	ფიზიკური დაზან იორიდიული პირების მიერ წარმოქმნილი მყარი საყოფაცხოვრებო ნარჩენი, აგრეთვე იმავე პირების მიერ წარმოქმნილი საკვები პროდუქტის მყარი ნარჩენი (ვადაგასული ან საკვებად უყარფისი), რომლის მოგროვებაც არ შეეკუთვნება მუსიციპალიტეტების კომპეტენციას		
ა	120-ზე (ტონა ან მკუბი) ნაკლები	35.00	12.00
ბ	100-დან 1000-ის (ტონა ან მკუბი) ჩაიფლით	30.00	10.00
გ	1000-ზე (ტონა ან მკუბი) მეტი	20.00	8.00
3	ფიზიკური დაზან იორიდიული პირების მიერ წარმოქმნილი სპეციფიური მყარი ნარჩენი (მაგ. აზბესტის შემცველი ნარჩენი)		
ა	35 ტ-ზე ნაკლები	35.00	
ბ	35 ტ-დან 350 ტ-ის ჩაიფლით	30.00	
გ	350 ტ-ზე მეტი	20.00	

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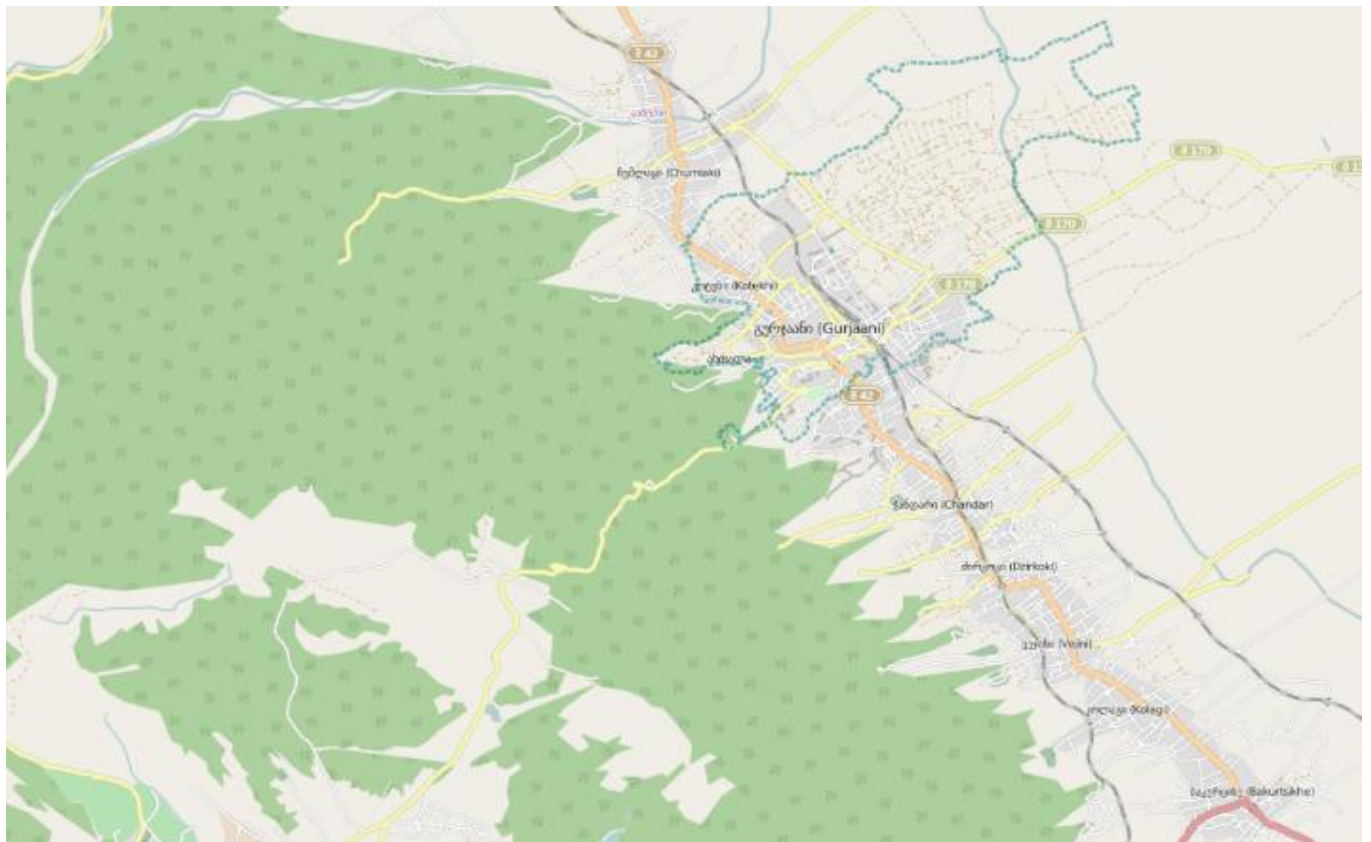
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ANNEX 3. INTERVIEWS WITH COMMUNITY AND THE ROADSIDE BUSINESSES

In the course of the ESIA session of interviews have been carried out to get information about public opinion and its attitude to the project. Bakurtsikhe, Kolagi, Dzirkoki, Chandari, Vejini Gurjaani village, Gurjaani city and Chumlaki residents, owners of the roadside businesses were interviewed.

The study area included:

- section from Bakurtsikhe outskirts (point 1) to the outskirts of Chumlaki (point 2); (along existing road)



As a part of the ESIA study, all roadside businesses in area of interest were registered. According to the survey the list includes: 59 small shops, 15 car maintenance stations, 7 pharmacies, 5 large shops, 45 small fruit and vegetable sellers and 7 small bakeries.

It should be mentioned that all business are active only from spring to autumn (May to October). Most of them are not operating in winter, or operate at very limited scale. All shop owners mentioned that reduction transit movement will not affect their business, about 90% of customers are from the local neighborhood.

According to the survey the car maintenance stations, pharmacies and small shops, are less prone to the change in the traffic flow. They will still serve the locals. It is expected that the traffic of tourists and holiday makers in this direction, including those going to Telavi and etc. will not change.

Effect of the traffic diversion on large shops will be low. According to the owners, the sales are not dependent on the traffic flow and/or the season.

Keeping the mentioned above in mind, fruit and vegetable sellers as the most vulnerable to the change were interviewed.

The interviews were carried out on August 2015.

The number of respondents (sample size) for the survey was selected as follows:

- 30 vendors – Fruit and vegetable sellers (total number of outlets is 45) were interviewed (level of confidence 94%, sample error 6%);
- 25 small shops were interviewed (level of confidence 90%, sample error 7%);
- 7 car maintenance stations were interviewed (level of confidence 90%, sample error 8%)

According to the survey 65% of employed are female. For the families of 70% of the respondents this employment is the only source of income. Behind each of them are their families (from 2 to 7 family members).

Most of the shops are operating for more than 10 years. All respondents except one refused to say approximate daily income. The owner of the mid-size shop in Bakurtsikhe said that his approximate turnover is 200-300 lari per day. As mentioned by the interviewees in recent years the number of customers decreased but the owners are keen to preserve their businesses and pay minimum salaries to employees even when their income is minimum and hardly enough for paying off the taxes.

The land plots the respondents own allow only subsistence farming. Of total number of interviewed 50% are pensioners, 40% have retired parent/parents in family.

The main concern of the residents is lack of employment in particular for youth. The attitude toward the project is dual. They agree that the road is necessary, are happy that diversion of traffic will reduce the risk of car accidents and improve air and noise quality in the settlement, but fear that they will have to stop their business as the number of customers reduces. In their opinion they or their family members must have priority during temporary employment. Most of the respondents are skeptical that establishment of alternative businesses will be feasible in short term prospective. In their opinion this will be possible only in case of support from the state.

Annex 1. Photo log















ANNEX 4 LIST OF CONTRIBUTORS TO ESIA

Revaz E nukidze	Project Manager Environmental and Resettlement Expert
Irakli Kaviladze	Waste Management
Ana Dolidze	Ecology
Levan Kalatozishvili	Ecology
Levan Kakubava	Public consultations