

Semi-annual Environmental Monitoring Report

Project Number :**SRIP/CS/QCBS-01**

Reporting time period January-July 2018

Republic of Georgia: Rehabilitation of Dzirula – Kharagauli – Moliti – Pona – Chumateleti Secondary Road Section (50 Km)

Financed by the Asian Development Bank and Asian
Infrastructure Investment Bank

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ACRONYMS & ABBREVIATIONS

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
CSEMP	Contract Specific Environmental Management Plan
DR	Department of Roads
DNP	Defects Notification Period
EA	Executing agency
EMP	Environmental Management Plan
EMS	Environmental Management System
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
IEE	Initial Environmental Examination
km	Kilometer
Ministry	Ministry of National Development and Infrastructure
PCU	Project Coordination Unit
PIU	Project Implementation Unit
PMU	Project Management Unit
SMEC	Snowy Mountains Engineering Corporation
SSEMP	Site Specific Environmental Management Plan
TBA	To be Advised
TOR	Terms of Reference

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1 INTRODUCTION

1.1 Preamble

1. This report represents the Semi – Annual Environmental Monitoring Review of Dzirula – Kharagauli –Moliti – Pona – Chumateleti Secondary Road Section (50 Km) Rehabilitation Project.
2. This report is first semi-Annual EMR for the project.

1.2 Headline Information

3. Project design review and construction activities are not commenced yet. There is protected area near the project related road section. The shortest distance between Borjomi-Kharagauli National Park (BKNP) and the existing project road is approximately 1.3 km. BKNP is separated from the existing project by a river gorge, which prevents the transposition of flora and fauna. Therefore the project will have no direct impact on the biodiversity of the BKNP. However construction contractor should select appropriate access roads to avoid disturbance of the protected area and provide site staff with special training to prevent poaching.
4. It is envisioned that the road, when improved, will enhance connectivity to a number of towns and villages at the foothills of the mountain ranges and can act as alternate route to parallel segments along E-60. Also, positive impact of the project will be local population's involvement in the road construction process.

2 PROJECT DESCRIPTION AND CURRENT ACTIVITIES

2.1 Project Description

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

6. The details of the proposed road project are:

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

6. For implementation purposes the project was divided into 2 separate sections of about 25 km each. First section (Construction Contractor „Black Sea Group”) covers the eastern ~ 25 km section of the above road from Moliti (km 24+620) to Chumateleti (km 50+244). The details of the proposed road section are:

- Rehabilitation and pavement of the project road from Moliti to Chumateleti according to Georgian National Standard for Public Motor Roads (SST Gzebi 2009), Geometrical and Structural Requirements with a design speed of 40 km/h.
- Replacement of 11 existing bridges, and construction of 2 new bridges
- Construction of 108 pipe culverts and 6 box culverts.
- Construction of side drains and other drainage structures.
- Provision of retaining walls and river protection measures, where necessary.
- Provision of adequate road signing and marking.
- Provision of safety barriers.

7. Construction Contractor for the Second Section (KP 24+620-KP 50+244) and scope of work is not clarified so far.

8. The road is to be designed according to Georgian geometric design standard, and accordingly, it shall be sufficient to carry the traffic loading efficiently and with the vehicles from the opposite directions can pass safely. The design elements for the cross section of the two-lane road are as follows:

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

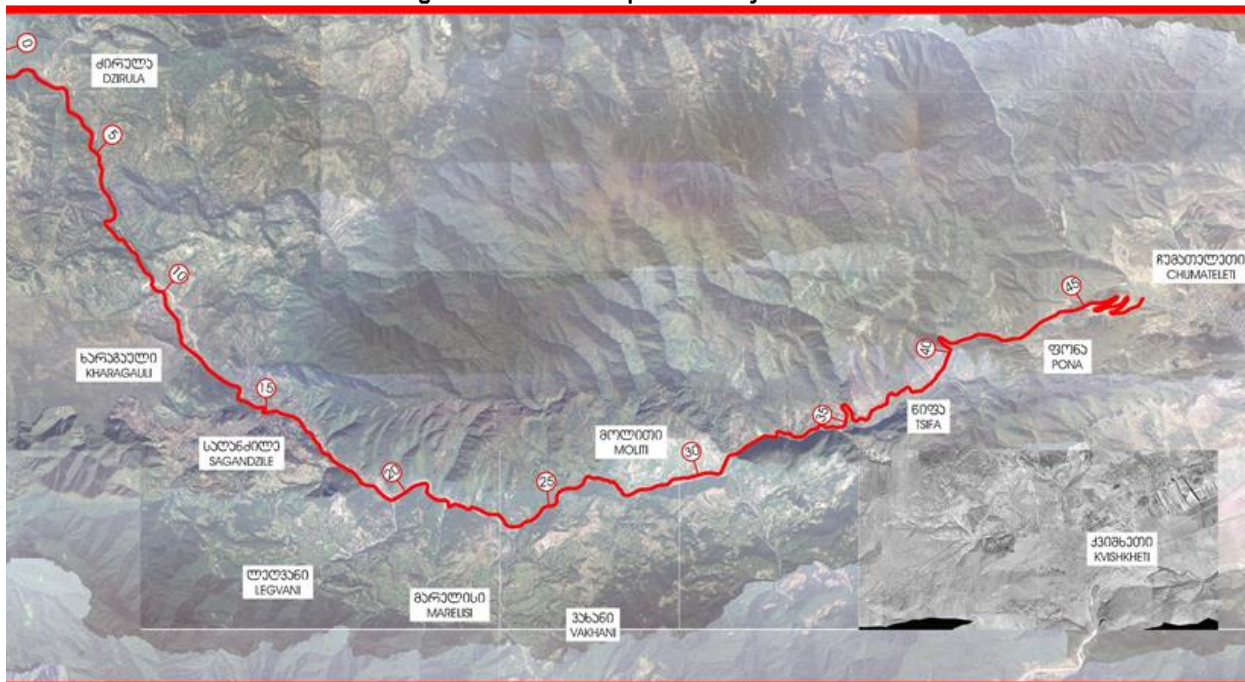
9. The preliminary road design was carried out considering following design philosophy:

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

The map of the project road is given in the **Figure 1** below.

Fig. 1: Map of Project Road

Figure 1: Location Map of the Project Road



10. The project is classified as category B for the environment under ADB's Safeguard Policy Statement (2009). Project implementation period is: 2018-2020.

11. The present Semi-annual Environmental Monitoring Report covers the period from January to June 2018.

2.2 Project Contracts and Management

12. A Consultancy Contract was awarded to JV of Pyunghwa Engineering Consultants Ltd/ Roads Rehabilitation and Modernization Supervision Direction Ltd for three phases of the project:

- a. Phase 1 – Design review, to be completed in a period of two months.
- b. Phase 2 – Construction supervision and contract administration. The construction period is for 2 years.
- c. Phase 3 – Defects Notification Period, two years.

13. The TOR for the Consultancy Contract contains the following tasks for the Environmental Specialists:

- a. Ensure that the provisions of the approved Environmental Management Plan are reflected in the Contractor's contract site-specific environmental management plan (SSEMP) prior to its acceptance by the Engineer, the Employer and ADB, and thereafter ensure that the Contractor complies in every respect with the provisions of the SSEMP;
- b. Develop an environmental auditing protocol for the construction period, regularly supervise the environmental monitoring, and submit periodic reports based on the monitoring data and laboratory analysis reports. These reports will be included as an annex to the Consultant's Monthly Report;
- c. Develop a program for hands-on training of Contractor's staff in implementing the SSEMP.
- d. Conduct Post-Construction Environmental Audit and prepare post-construction environmental audit report with filled environmental audit checklist.

14. The construction contract has been awarded to JV of Pyunghwa Engineering Consultants Ltd/ Roads Rehabilitation and Modernization Supervision Direction Ltd - Joint Venture. The Notice to Commence has not yet been given, and construction activity has therefore not commenced.

The Environmental Specialists will be mobilized when the construction contract commences. The names and contact details of environmental staff of Consultancy Company is given in the **Table 1** below:

Table 1: Environmental staff of SC

Position	Name	Nationality	Tenure
Environmental Specialist	D.K. Pandey	Indian	9 months field;
Environmental Specialist	ShalvaBosikashvili sbosikashvili@yahoo.com 595 116041 Cell Phone	Georgian	16 months field

Construction Contractor for first section is LTD „Black Sea Group”, contact details of project manager and environmental staff is given in the **Table 2** below.

Table 2: Main staff of CC

Position	Name	Nationality
Project Manager	Geno Akopashvili	Georgian
Environmental Specialist	Ketevan Nadirashvili 577 992959 Ketevan_Nadirashvili@BCGcom.ge	Georgian

2.3 Project Activities During Current Reporting Period

15. Contract signed on 01.08.2018, and construction activities have not been commenced yet.

2.4 Description of Any Changes to Project Design

N/A

2.5 Description of Any Changes to Agreed Construction methods

N/A

3. ENVIRONMENTAL SAFEGUARD ACTIVITIES

3.1 General Description of Environmental Safeguard Activities

16. The Supervision Consultant will supervise and monitor the project construction process. The SC includes Environment Specialist (national) as part of their team to oversee the overall implementation of environmental management plan (EMP)/SEMP, environmental monitoring, and compliance to the environmental requirements of ADB. SC Environmental Specialist will prepare section specific report for environment under overall Quarterly Construction Report required by ADB, monitor the environmental compliance of the Construction Contractor.

3.2 Site Audits

N/A

3.3 Issues Tracking (Based on Non-Conformance Notices)

N/A

3.4 Trends

N/A

3.5 Unanticipated Environmental Impacts or Risks

N/A

4. RESULTS OF ENVIRONMENTAL MONITORING

4.1 Overview of Monitoring Conducted during Current Period

17. Environmental monitoring will start immediately after the commencement of civil works. Baseline measurements are not performed yet, and should be performed before the construction activities commencement (Pre-Construction Baseline Measurements guidelines are given in **Annex 2**). According to the project EIA, periodic parametric measurements of air, noise and water quality will be carried out by the construction contractor. Locations of measurements will be defined by the method statement for particular area.

4.2 Trends

N/A

4.3 Summary of Monitoring Outcomes

N/A

4.4 Material Resources Utilisation

N/A

4.4.1 Current Period

N/A

4.5 Waste Management

N/A

4.5.1 Current Period

N/A

4.6 Health and Safety

4.6.1 Community Health and Safety

N/A

4.6.2 Worker Safety and Health

N/A

4.6.3 Training

N/A

5. FUNCTIONING OF THE SEMP

5.1 SEMP Review

18. Site Specific and Topic Specific EMPs will be prepared before commencement of Construction activities. Specific EMPs will be prepared by the Contractor under guidance of Supervision Consultant, endorsed by the SC and approved by PIU/RD (and ADB as necessary) before commencement of civil works. During preparation of SEMP existing EMP will be used as a baseline document by CC (see **Annex 1**).

6. GOOD PRACTICE AND OPPORTUNITY FOR IMPROVEMENT

6.1 Good Practice

Not yet applicable.

6.2 Opportunities for Improvement

Not yet applicable.

7. SUMMARY AND RECOMMENDATIONS

7.1 Summary

Not yet applicable.

7.2 Recommendations

19. The following activities are planned for the next July-December 2018 reporting period:

- Construction Contractor to prepare the site-specific environmental management plans (SEMPs) before commencement of construction activities for Section 1 -December 2018;
- Construction Contractor to prepare the following Topic Specific Environmental and Social Management Plans: Waste Management Plan, Pedestrian and Traffic Management Plan, Health and Safety Plan, etc. before commencement of construction activities for section 1– March2019;
- Construction Contractor to conduct measurements of water, air and noise on regular bases before commencement of Construction activities - September 2018.
- Carry out pre-construction survey of buildings and structures within 50m distance from the highway.
- Carry out vibration study and prepare vibration mitigation plan.
- Provide CC staff with induction HSE training.

ANNEXES:

Annex 1 – Environmental Management Plan

Environmental Management Plan
EMP - Construction Phase Mitigation

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
Topography	<p>Cut and fill operations have potential to impact on natural resources, landscape and properties;</p> <p>Applicable strategies and principles</p>	<p>To minimize the potential impacts associated to cut and fill operations the Contractor shall comply with the following strategies and principles:</p> <ul style="list-style-type: none"> • Deposition areas should be ascertained by the Contractor prior to cutting or excavations. • As a rule the preferred strategy for managing surplus materials from cut sections is their possible reuse instead of considering the use of new quarrying material. Only when this is not possible, e.g. because materials are unsuitable for reuse, the use of quarry material for fill or of dumping surplus may be considered. Such approach will also be key for reducing construction traffic, which has potential to cause damage to remaining roads, causes risks to communities, generates nuisance through noise and dust etc. • Requirement for due diligence will apply to any dump sites and material to be disposed of. Any sites proposed for permanent disposal will require prior formal approval. If impacts are likely to be significant an assessment or at the least a DD report will be needed from the Contractor. • Temporary and permanent storage of materials should be confined to Government-owned land and in no circumstances should be dumped on agricultural or productive lands (without owner’s written permission) or be allowed to directly or indirectly affect any watercourse or irrigation channels. • In the event of any spoil or debris from construction works being deposited in any of the aforementioned areas or any silt washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of the Engineer. 	<ul style="list-style-type: none"> • Contractor to implement mitigation. • Engineer to routinely monitor Contractors deposition/ dumping activities. • Approvals for waste disposal sites to be sought from the Concerned Agencies by the Contractor.

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
	Quarries	<p>Suitable borrow areas have been identified during the FS and are described in this IEE. These borrow areas are already in operation, hence environmental impacts such as the potential disfigurement of the landscape, vegetation losses and damage to access roads are kept to a minimum.</p> <p>Prior to start material extraction the Contractor shall submit his SSEMP through the Construction Supervisor (CS) to the Executing agency of the PIU indicating the location of the proposed extraction site as well as proposed rehabilitation measures and implementation schedule for the borrow areas and access roads – in line with the applicable legislation. Rehabilitation measures may not be necessary for borrow areas still in operation after road works have finished. The SSEMP needs to address the sensitive issues of avoidance of transportation through residential areas as far as technically feasible and closure rehabilitation.</p> <ul style="list-style-type: none"> • For the purpose of surface water protection material stockpiles shall be located at least 100 m away from any surface waters. • For dust suppression unpaved access road shall be watered during critical dry periods in the vicinity of settlements. <p>Should the Contractor decide to establish his own new quarry, he will be responsible for the entire facility with respect to all permitting and environmental requirements. Prior to opening of any quarry or rock crushing facility, the Contractor will require approval from the relevant Concerned Agencies and the Engineer to ensure that land owners are adequately compensated for land use and that the sites are not located in an area likely to cause significant detriment to the local environment.</p> <p>To ensure that this will be the case Contractors should ensure that quarries and crusher plants are:</p>	<ul style="list-style-type: none"> • Concerned Agencies to approve locations. • Contractor to obtain necessary permits. • Engineer to review permits and approvals prior to the opening of the site. • Contractor to submit Quarry Reinstatement Plan to the Contractor; Engineer to review and approve. • Engineer to inspect the reinstatement work on the quarry area by the Contractor

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
	Quarries (contd.)	<ul style="list-style-type: none"> • Located at least 300 meters from settlements to avoid noise and dust impacts; • Located outside of agricultural land; and • Where possible located on Government-owned lands. • Quarry areas must be reinstated prior to the completion of the project. • Silt-laden water should be retained in sedimentation ponds to allow silt materials to settle; water-recycling should be considered to minimize turbidity in receiving waters. • A Quarry Site Reinstatement Plan should be presented by the Contractor to the Engineer. The Quarry Site Reinstatement Plan must be approved by the Engineer with the concurrence of the RD prior to the start of site operations by the Contractor. • A due diligence report shall be provided by the Contractor on all quarry sites whether existing or new. If new, all appropriate permitting etc. required and legislation must be followed. 	
	Borrow Pits	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> • Borrow Pit restoration according to the SSEMP will follow the completion of works (e.g. levelling, re-spreading of top soil; revegetation). 	<ul style="list-style-type: none"> • Contractor to implement mitigation • Engineer to routinely monitor Contractors activities. • Contractor to submit Site Reinstatement Plan, Engineer to review and approve. • Engineer to inspect the reinstatement work on the borrow pit by the Contractor
	Use of other materials	<p>Alluvial material which will be excavated upstream from blocked culvert areas may be used as base material. This material shall be tested by the Contractor and Engineer for its suitability as base material before it may be used. The Contractor must use such material first before using any other quarry or borrow pit within 3 km from any such alluvial deposit.</p>	<ul style="list-style-type: none"> • Engineer to test material before use as base material.

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
Soil and Ground Water Quality	Contamination due to Spills or Hazardous Materials	<p>The Contractor shall ensure that:</p> <ul style="list-style-type: none"> Any storage of fuel, lubricants, hazardous waste and chemicals, (if any) shall be sited on an impervious base within secondary containment and secured by fencing. The storage area shall be located away from any watercourse or wetlands. The base and bund walls shall be impermeable and of sufficient capacity to contain 110 percent of the volume of tanks. The construction camp maintenance yard shall be constructed on impervious layer with adequate drainage to collect spills; there shall be no vehicle maintenance activities on open ground. Filling and refueling shall be strictly controlled and subject to formal procedures. Drip pans shall be placed under any filling and fueling areas. Waste oils shall be stored and disposed of by a licensed contractor. All valves and trigger guns shall be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use. The contents of any tank / drum shall be clearly marked. Measures to be taken to ensure that no contaminated discharges enter any soils. No bitumen drums or containers, full or used, shall be stored on open ground. They shall only be stored on impervious layer. Areas using bitumen shall be constructed on impervious layer to prevent seepage of oils into the soils. 	<ul style="list-style-type: none"> Contractor to implement mitigation Engineer to routinely monitor Contractors activities.
Surface Water and Hydrology	Drainage and Flooding	During construction the Contractor is required to construct, maintain, remove and reinstate as necessary temporary drainage works and take all other precautions necessary for the avoidance of damage by flooding and silt washed down from the Works.	<ul style="list-style-type: none"> Contractor to implement mitigation Engineer to routinely monitor Contractors activities.
	Construction Camps and Storage Areas	<p>The Contractor shall ensure the following conditions are met:</p> <ul style="list-style-type: none"> Wastewater arising on the site shall be collected and safely disposed There shall be no direct discharge of sanitary or wash water to surface water. Disposal of materials such as, but not limited to, lubricating oil and onto the ground or water bodies shall be prohibited. 	<ul style="list-style-type: none"> Contractor to implement mitigation Engineer to routinely monitor Contractors activities.

EMP: Construction Phase Mitigation

Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
		<ul style="list-style-type: none"> • Liquid material storage containment areas shall not drain directly to surface water. • Lubricating and fuel oil spills shall be cleaned up immediately and spill clean-up shall be materials be maintained at the storage area. • Construction and work sites will be equipped with sanitary latrines that do not pollute surface waters. • Discharge of sediment-laden construction water directly into surface watercourses will be forbidden. Sediment laden construction water will be discharged into settling lagoons or tanks prior to final discharge. • Spill clean-up equipment will be maintained on site. The following conditions to avoid adverse impacts due to improper storage of fuel and chemical storage: <ul style="list-style-type: none"> - Fueling operations shall occur only within containment areas. - Any fuel, lubricants, hazardous materials, hazardous waste and chemicals, (if any) shall be stored on an impervious base within bund and safely secured by fencing. The storage area shall be located away from any watercourse or wetlands. The base and bund walls shall be impermeable and of sufficient capacity to contain 110 percent of the volume of tanks. - Filling and refueling shall be strictly controlled and subject to formal procedures and will take place within areas surrounded by bunds to contain spills / leaks of potentially contaminating liquids. - All valves and trigger guns shall be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use. - The contents of any tank or drum shall be clearly marked. Measures shall be taken to ensure that no contaminated discharges enter any drain or watercourses. - Disposal of lubricating oil and other potentially hazardous liquids onto the ground or water bodies will be prohibited. - Should any accidental spills occur immediate clean-up will be undertaken and all cleanup materials stored in a secure area for disposal to a site authorized for hazardous waste • If warranted by the Engineer, the Contractor shall provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from the 	

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
	Bridge Construction	<p>sites. If so requested, the Contractor shall ensure that all vehicles are properly cleaned (bodies and tires are free of sand and mud) prior to leaving the site areas. The Contractor shall provide necessary cleaning facilities on site and ensure that no water or debris from such cleaning operations is deposited off-site.</p> <p>No pillars are drilled into the river for bridge construction. Bridges will be constructed by slabs only. Therefore generation of turbidity plumes and sedimentation which could impact aquatic organisms can be excluded. No impacts are expected on river ecology.</p> <p>The Contractor shall ensure provision/or performance of the following:</p> <ul style="list-style-type: none"> • Contractor shall provide additional measures to catch any debris from falling into the river; • Structural elements shall be casted at sufficient distance from the river to prevent concrete mix from getting into the water. 	<ul style="list-style-type: none"> • Contractor to implement mitigation. • Engineer to routinely monitor Contractors activities.
Air Quality	Open burning of waste materials	The Contractor shall ensure no burning of debris or other materials will occur on the Site without permission of the Engineer.	<ul style="list-style-type: none"> • Contractor to implement mitigation. • Engineer to routinely monitor Contractors activities.
	Fuel Emissions	The Contractor shall ensure that no furnaces, boilers or other similar plant or equipment using any fuel that may produce air pollutants will be installed without prior written consent of the Engineer.	<ul style="list-style-type: none"> • Contractor to implement mitigation. • Engineer to routinely monitor Contractors activities.

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
	Exhaust emissions from the operation of construction machinery	<p>The Contractor shall ensure construction equipment shall be maintained to a good standard and fitted with pollution control devices. The equipment (including pollution control devices) will be checked at regular intervals by the Engineer to ensure they are maintained in working order: the inspection result will be recorded by the Contractor & Engineer as part of environmental monitoring. In addition, the Contractor shall:</p> <ul style="list-style-type: none"> • Discourage of the idling of engines; • Prohibit the use of equipment and machinery that causes excessive pollution (i.e. visible smoke) at project work sites; • Ensure material stockpiles being located in sheltered areas and covered with tarpaulins or other such suitable covering to prevent material becoming airborne. 	<ul style="list-style-type: none"> • Contractor to implement mitigation. • Engineer to routinely monitor Contractors activities.
	Fugitive emissions from quarries and asphalt plants.	<p>Quarries and asphalt plant will be located at sufficient distance to any settlements. Therefore no impacts due to fugitive emissions are expected.</p>	<ul style="list-style-type: none"> • Engineer to routinely monitor Contractors activities.
	Dust generated from haul roads, unpaved roads, exposed soils and material stock piles	<p>The Contractor shall ensure that the following dust suppression measures will be instituted:</p> <ul style="list-style-type: none"> • All trucks used for transporting materials to and from the site will be covered with canvas tarpaulins, or other acceptable type of cover (which shall be properly secured) to prevent debris and/or materials from falling from or being blown off the vehicle(s); • Areas of reclamation shall be completed, including final compaction, as quickly as possible consistent with good practice to limit the creation of wind-blown dust. • Hard surfaces will be required in areas with regular movements of vehicles; and • Effective use of water sprays will be implemented (e.g., all unpaved roads within the construction areas of the Site shall be sprayed during 	<ul style="list-style-type: none"> • Contractor to implement mitigation • Engineer to routinely monitor Contractors activities.

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
		critical dry periods at least twice each day, and more often if necessary to control dust to the satisfaction of the Engineer).	
Generation of Noise and Vibration	Construction Noise	<p>The Contractor shall ensure provision of the following:</p> <ul style="list-style-type: none"> • Source Controls, i.e., requirements that all exhaust systems will be maintained in good working order; properly designed engine enclosures and intake silencers will be employed; and regular equipment maintenance will be undertaken; • Site Controls, i.e., requirements that stationary equipment will be placed as far from sensitive land uses as practical; selected to minimize objectionable noise impacts; and provided with shielding mechanisms where possible; • Work near Sensitive Receptors shall be limited to short term activities as far as technically feasible; • Community Awareness, i.e., public notification of construction operations will incorporate noise considerations; methods to handle complaints will be specified. Disposal sites and haul routes will be coordinated with local officials. <p>Planning for low volume charges along the most sensitive sections of the route could help to reduce the potential for vibration induced damage to structures.</p> <p>In the event of damage proven to be due to the Contractor's activities, owners of structures will be fully compensated.</p>	<ul style="list-style-type: none"> • Contractor to implement mitigation • Engineer to routinely monitor Contractors activities.
	Vibration	<p>To ensure the effective management of potential vibration impacts the Contractor shall prepare and implement a Vibration Management Plan for the most sensitive locations, namely</p> <ul style="list-style-type: none"> - Moli (Nebodziri); - Tsipa (Golatabani); and - Chumateleti. <p>As a minimum the Plan shall consider the following elements and steps:</p> <ul style="list-style-type: none"> • Identification of potential problem areas / structures surrounding the construction site and material transport routes; 	<ul style="list-style-type: none"> • Contractor to implement mitigation • Engineer to routinely monitor Contractors activities

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
		<ul style="list-style-type: none"> • Preconstruction survey of potentially affected structures to document all existing defects and damage; • Information of the public about planned activities with potential for damaging private properties; • Setting up a construction schedule to minimize adverse effects / nuisance for the local population; • Specification of technical measures to minimize vibration levels at source (e.g. selection of construction methods / equipment / machinery); • Timely notification of local residents and property owners about imminent vibration-generating activities; • Post-construction survey of potential vibration effects to provide a reference for the evaluation of any proven damage resulting from construction and assessment of compensation requirements; • Response to / investigation of complaints. Preferably, the Contractor should develop a specific vibration complaint form to document the details of any complaint. 	
	Vibration	<p>Based on the conducted Vibration Impact Assessment the following mitigation measures were developed:</p> <p>The bidding documents for civil works will require that the Contractor submit to the Engineer for review and approval a written Construction Vibration Management Plan (CVMP) detailing the procedures for vibration monitoring and control. The CVMP plan will include the requirement for trial construction sections to determine the likely magnitude of vibrations at defined distances from a vibration source. These programs would be reviewed and approved by the Engineer to ensure compliance with contractual specifications, including the EMP.</p> <p>The maximum permissible vibration limit set at 6.5 mm/s must not be exceeded within the defined contour (7m from the road edge) where houses may be at potential risk of damages. Where the results of the vibration monitoring, or from a trial construction section, show that the specified construction vibration limit is reached at a particular location, the Contractor would be directed by the Engineer.</p>	<ul style="list-style-type: none"> • Contractor to implement mitigation • Engineer to routinely monitor Contractors activities

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
		<p>To suspend the construction activities that generate the excessive vibration at such location, and with the approval of the Engineer take mitigation actions necessary to keep the construction vibration within the specified limit.</p> <p>Such actions may include alternative construction methods such as:</p> <ul style="list-style-type: none"> • decrease of vibration emission from the particular equipment item; • substitution of the particular equipment item at such location by other equipment capable of variable vibration control; • use of smaller equipment; • compaction without vibration rollers; • decreasing the thickness of material layers below the maximum thickness permissible under the specification; • building wave barriers (trench or ditch) where appropriate; • change the pavement type for example from flexible to rigid pavement, • any other method of Contractor's choice that may be used while ensuring compliance with the specification for the material that is being compacted. <p>Once work in a particular section of the road has been scheduled, nearby residents and property owners should be notified about the specific times and dates that vibration generating activity will occur. Night work will be avoided.</p> <p>The described mitigation measures need also to be applied at the following 8 fragile residential buildings outside the 7 m contour line.</p> <ul style="list-style-type: none"> • building 34 – km 29+600, rs, 7.3 m distance from future road edge • building 63 – km 38+670, rs, 8.2 m distance from future road edge • building 67 – km 38+840, rs, 11.5 m distance from future road edge 	

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
		<ul style="list-style-type: none"> • building 74 – km 39+220, rs, 10.1 m distance from future road edge • building 81 – km 39+730, rs, 13 m distance from future road edge • building 90 – km 39+900, rs, 13.7 m distance from future road edge • building 107 – km 43+740, rs, 12.0 m distance from future road edge • building 114 – km 43+420, ls, 12.2 m distance from future road edge 	
Introduced Geo-Hazards	Slope Stabilization	<p>The Contractor shall be responsible for the following:</p> <ul style="list-style-type: none"> • Final forming and re-vegetation will be completed by the Contractor as soon as possible following fill placement to facilitate regeneration of a stabilizing ground cover. • Trenching will be used where necessary to ensure successful establishment of vegetation. • Seeding with a fast growing crop and native seed mix will occur immediately after fill placement to prevent scour and to encourage stabilization; 	<ul style="list-style-type: none"> • Contractor to implement mitigation • Engineer to routinely monitor Contractors activities.
	Erosion	<p>The Contractor will be responsible for ensuring:</p> <ul style="list-style-type: none"> • Material that is less susceptible to erosion will be selected for placement around bridges and culverts. • Re-vegetation of exposed areas including; <ul style="list-style-type: none"> (i) selection of fast growing and grazing resistant species of local flora; (ii) immediate re-vegetation of all slopes and embankments if not covered with gabion baskets; (iii) placement of fiber mats to encourage vegetation growth, although due to the arid conditions in most of the road, this may only be feasible where there is regular rainfall or other natural water supply. 	<ul style="list-style-type: none"> • Contractor to implement mitigation • Engineer to routinely monitor Contractors activities.
Bridges and Waterways	Demolition of existing structural components	<ul style="list-style-type: none"> • Contractor should provide additional measures to catch debris from falling into the river 	<ul style="list-style-type: none"> • Contractor to implement mitigation measures; • Engineer to check and ascertain correct results

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
	Construction of superstructures	<p>No pillars are drilled into the river for bridge construction. Bridges will be constructed by slabs only. Therefore generation of turbidity plumes and sedimentation which could impact aquatic organisms can be excluded. No impacts are expected on River ecology.</p> <p>The Contractor shall ensure provision/or performance of the following:</p> <ul style="list-style-type: none"> • Excavation methodologies should be done to minimize stockpiling near flowing water; • Temporary rock protection should be provided to prevent soil materials to be washed away. • When casting structural elements on site, spillage into the water should be prevented by installing proper measures to catch any spill; • Structural elements should be casted far from the river to prevent concrete mix from getting into the water. 	<ul style="list-style-type: none"> • Contractor to implement mitigation measures; • Engineer to check and ascertain appropriate results are attained
Processing Plants and Campsites	Water contamination	<p>Prior to construction start the SSEMP shall be submitted addressing the following:</p> <ul style="list-style-type: none"> • Re-instatement of the sites for processing plants and the Contractor's camp after completion of works; Plan to be approved by the Engineer; • Minimization of impacts regarding air quality and noise is prevented because the construction facilities are located at sufficient distance to any sensitive receptors; • Safe collection and disposal of waste water, therefore ground and surface water pollution from contractor' facilities is avoided. • Complaints from communities will be properly and promptly responded to; • Should contamination be caused during camp operation, the site will need to be properly restored with appropriate testing done for verification, prior to handover to Government or private owner. 	<ul style="list-style-type: none"> • Contractor to implement mitigation measures; • Engineer to check and ascertain appropriate results are attained
	Air Quality and noise issues		
	Contaminated effluents		
	Defacement of topography		
	Resource competition with village residents		
Transportation of Construction Materials and Wastes	Droppings of materials & wastes	<p>The Contractor shall ensure provision/performance of the following:</p> <ul style="list-style-type: none"> • Liquids transported to or from the sites should be placed in sealed containment; 	<ul style="list-style-type: none"> • Contractor to implement mitigation measures; • Engineer to check and ascertain appropriate results are attained
	Spills from haul trucks		

EMP: Construction Phase Mitigation																																																			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities																																																
	Dust from uncovered trucks	<ul style="list-style-type: none"> • Soil, gravel and stone should be covered with tarp or any material that can effectively prevent the dropping; • Drivers should abide by safe driving practices, especially through communities; • Driver and Contractor's personnel should ensure that materials are being safely loaded, hauled and unloaded. • Emergency spillage and clean-up procedure should be drafted by the Contractor and approved by the Engineer. 																																																	
Biological	Loss of endangered flora - <i>Orchids:</i>	<p>Transplantation of endangered plant species:</p> <ul style="list-style-type: none"> • Preparation of a MES for the transplantation of endangered orchid species based on consultations with specialists, e.g. from the Institute of Botany, Ilia State University or from the National Botanical Garden of Georgia • Transplantation of endangered orchid species (<i>Orchis simia</i> and <i>O. purpurea</i>) from along the Project road to safe nearby receptor sites with similar habitat conditions in accordance with the approved Method Statement. • Preparation of suitable records on the receptor sites (GPS coordinates) and preparation of documentations. <p>The Contractor shall ensure timely implementation and completion of the above measures (i.e. early consultation for the preparation of the MES; / execution of transplantations during the period April – May. In any case transplantations shall be finalised prior to the start of construction activities along the Project route:</p> <table border="1"> <thead> <tr> <th>Site #</th> <th>Eastings</th> <th>Northings</th> <th>Road Side</th> <th>Site #</th> <th>Eastings</th> <th>Northings</th> <th>Road Side</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>377288;</td> <td>4653955</td> <td>LHS</td> <td>15.</td> <td>375660;</td> <td>4653813</td> <td>RHS</td> </tr> <tr> <td>2.</td> <td>377287;</td> <td>4654008</td> <td>RHS</td> <td>16.</td> <td>375661;</td> <td>4653814</td> <td>LHS</td> </tr> <tr> <td>3.</td> <td>377203;</td> <td>4654055</td> <td>LHS</td> <td>17.</td> <td>375414;</td> <td>4653733</td> <td>LHS</td> </tr> <tr> <td>4.</td> <td>377204;</td> <td>4654054</td> <td>LHS</td> <td>18.</td> <td>375357;</td> <td>4653571</td> <td>LHS</td> </tr> <tr> <td>5.</td> <td>376601;</td> <td>4653920</td> <td>RHS</td> <td>19.</td> <td>374115;</td> <td>4653028</td> <td>LHS</td> </tr> </tbody> </table>	Site #	Eastings	Northings	Road Side	Site #	Eastings	Northings	Road Side	1.	377288;	4653955	LHS	15.	375660;	4653813	RHS	2.	377287;	4654008	RHS	16.	375661;	4653814	LHS	3.	377203;	4654055	LHS	17.	375414;	4653733	LHS	4.	377204;	4654054	LHS	18.	375357;	4653571	LHS	5.	376601;	4653920	RHS	19.	374115;	4653028	LHS	<ul style="list-style-type: none"> • Contractor to timely implement mitigation / necessary transplantations • Engineer to monitor Contractor's activities and timely completion of transplantations / preparation of records on receptor sites.
Site #	Eastings	Northings	Road Side	Site #	Eastings	Northings	Road Side																																												
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EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
		6. 377159; 4654302 RHS 20. 373615; 4653191 RHS 7. 376532; 4654130 RHS 21. 373479; 4653219 LHS 8. 376397; 4654084 RHS 22. 372733; 4652999 LHS 9. 376209; 4654046 RHS 23. 371286; 4651712 LHS 10. 376225; 4654012 LHS 24. 370929; 4651536 LHS 11. 376234; 4653968 RHS 25. 370107; 4650882 LHS 12. 375882; 4653872 RHS 26. 369579; 4651063 LHS 13. 375854; 4653864 LHS 27. 368864; 4650677 LHS 14. 375705; 4653732 RHS.	
	<p><i>Trees and shrubs</i></p> <p><i>Trees and shrubs (contd.)</i></p> <p>Impacts to fauna</p>	<ul style="list-style-type: none"> Each tree removed by the Contractor should be replaced by at least two new saplings of the same species or other at suitable locations, all as designated by the tree owner. Tree translocation should be explored and done whenever feasible. Dead saplings should be replaced as soon as possible. No trees should be cut in the area without written permission from the Engineer. Supplying appropriate and adequate fuel in workers' camps to prevent fuel-wood collection from unauthorized sources. <ul style="list-style-type: none"> Where trees need to be cut from inside the State Forest Fund Area Contractor to appoint a licensed specialist to prepare a tree inventory and establish the amount of compensation payment required in accordance the formal procedural requirements. <p>Work crews are to be sensitised not to harm or kill any wild animals and to allow them escaping during work execution.</p>	<ul style="list-style-type: none"> Contractor to instruct his personnel not to harm wildlife Engineer to routinely monitor Contractors' activities.
Sensitive Areas	Protecting BKNP & an	The Engineer to ensure there will be no adverse impacts on protected areas, particularly the BKNP or areas of special conservation interest such	<ul style="list-style-type: none"> Contractor to obtain necessary permits

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
	officially proposed Emerald site	as the officially proposed Emerald Site (GE10000010 Borjomi – Kharagauli), should the Contractor opt to open new borrow pits or access roads. The Contractor shall be required to obtain approval from the MoENRP and local concerned agencies.	<ul style="list-style-type: none"> • Engineer to routinely monitor Contractors activities.
Construction Waste & Domestic Waste	Waste in Construction Camps and other ancillary facilities	The Contractor will be required to coordinate all construction camp activities with neighbouring land uses. The Contractor shall also be responsible to maintain and clean-up campsites and respect the rights of local landowners. If located outside the RoW, written agreements with local landowners for temporary use of the property will be required and sites must be restored to a level acceptable to the owner within predetermined time period.	<ul style="list-style-type: none"> • Contractor to implement mitigation. • Engineer to routinely monitor Contractors activities.
	Spoil	Under no circumstances shall the Contractor dump excess materials on private lands without permission of the owner and approval from the Engineer. In addition, excess spoil shall not be dumped or pushed into rivers at any location unless in low volumes and agreed upon with the Engineer and with approval from the Concerned Agencies.	<ul style="list-style-type: none"> • Contractor to implement mitigation. • Concerned Agencies to approve any waste disposal to the River. • Engineer to routinely monitor Contractors activities.
	Inert solid & liquid waste	<p>The Contractor shall be responsible for the following:</p> <ul style="list-style-type: none"> • Provide refuse containers at each worksite; • Maintain all construction sites in a clean, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal; • Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process, and • Collect and transport non-hazardous wastes to all approved disposal sites. The sites for waste disposal shall be agreed with the local municipal authorities and Concerned Agencies. A specialized company may be contracted, if available, to ensure collection of domestic and general waste from camps and temporary storage areas and transportation to landfills approved and licensed by the Concerned Agencies. 	<ul style="list-style-type: none"> • Contractor to implement mitigation. • Concerned Agencies to approve any waste disposal site. • Engineer to routinely monitor Contractors activities.
	Asphalt	Waste from the handling of asphalt should be managed properly according to the applicable legislation and the stipulations in the approved SSEMP.	<ul style="list-style-type: none"> • Contractor to implement mitigation.

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
	Hazardous Waste	<p>Reinstatement of the site will be done after the project completion according to the stipulations in the SSEMP.</p> <p>Any hazardous waste will be collected, temporarily stored and safely disposed of according to the applicable legislation and the stipulations in the approved SSEMP. Disposal locations of hazardous wastes should be agreed with the Concerned Agencies. The Contractor shall collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at the temporary storage sites and further at the locations approved by Concerned Agencies or pass it to a licensed operator having environmental permit on the operation of hazardous wastes.</p>	<ul style="list-style-type: none"> • Engineer to routinely monitor Contractors activities. • Contractor to implement mitigation. • Concerned Agencies to approve any waste disposal site. • Engineer to routinely monitor Contractors activities.
Health & Safety	Worker 's Health & Safety	<p>The Contractor shall be responsible for provision of:</p> <ul style="list-style-type: none"> • Safety Training Program:A Safety Training Program is required and shall consist of an Initial Safety Instruction Course. All workmen shall be required to attend a safety instruction course within their first week on Site and Periodic Safety Training Courses. • Safety Meetings: Regular safety meetings will be conducted on a monthly basis and shall require attendance by the safety representatives of Subcontractors unless otherwise agreed by the Engineer. • Safety Inspections: The Contractor shall regularly inspect, test and maintain all safety equipment, scaffolds, guardrails, working platforms, hoists, ladders and other means of access, lifting, lighting, signing and guarding equipment. Lights and signs shall be kept clear of obstructions and legible to read. Equipment, which is damaged, dirty, incorrectly positioned or not in working order, shall be repaired or replaced immediately. • Safety Equipment and Clothing: Safety equipment and protective clothing are required to be available on the Site at all material times and measures for the effective enforcement of proper utilization and necessary replacement of such equipment and clothing, and all construction plant and equipment used on or around the Site shall be fitted with appropriate safety devices. 	<ul style="list-style-type: none"> • Contractor to implement mitigation • Engineer to routinely monitor Contractors activities.

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

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

EMP: Construction Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
Cultural, Historical Monuments and Archaeological Sites	Impacts to Historical and archaeological areas	<p>To avoid potential adverse impacts to cultural, historic and archaeological resources, the Contractor shall:</p> <ul style="list-style-type: none"> • Instruct his personnel to work with care near cultural monuments (if any), and • In the event of unanticipated discoveries of cultural or historic artifacts (movable or immovable) in the course of the work, the Contractor shall take all necessary measures to protect the findings and notify the Engineer and the Concerned Agencies. If continuation of the work would endanger the finding, project work shall be suspended until a solution for preservation of the artifacts is agreed upon. 	<ul style="list-style-type: none"> • Contractor to implement mitigation • Engineer to routinely monitor Contractors activities.
Impact to Households	Impairment of access; Livelihood Impact; Hampered Mobility	<p>During construction, access should be maintained by providing temporary detour, by-pass or diversion paths for vehicles and people in the area. This should be with proper notification and consultation with the local population.</p>	<ul style="list-style-type: none"> • Contractor to implement mitigation measures; Engineer to check and ascertain appropriate results are attained
	Health and Nuisance	<ul style="list-style-type: none"> • Suppression of dust by regular spraying of soil at the site will be necessary. • Noise should be minimized by equipping construction equipment with mufflers and ensuring regular proper maintenance. • Usage of equipment should be scheduled in order to minimize noises. • Blasting, if to be done, should be properly announced and safety measures to the people be implemented. 	
	Potential Employment difficulty	<p>Contractor should be encouraged to hire local labour, including women in the 6 villages along the route of Project section n 2(east).</p>	

Table 1: EMP - Operations and Maintenance Phase Mitigation

EMP Operational and Maintenance Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
Soils	Erosion	Contracts stipulated that the Contractor shall be liable for a one year defects liability period. During this year the Concerned Agencies should undertake regular observational monitoring of the Project Road to ensure that engineering works and vegetation growth have prevented erosion impacts. If the Concerned Agencies discover any potential issues they shall report their findings to the RD who shall then make the Contractor responsible for final improvements. Final payments cannot be made until outstanding issues are resolved.	<ul style="list-style-type: none"> Concerned Agencies to monitor vegetation growth and erosion impacts during defects liability period.
Hydrology	Impacts to hydrology and water quality as a result of construction activities	Impacts on hydrology and water quality may occur at river crossings due to bridge construction activities. In this Project no pillars are drilled into the river bed for bridge construction. Bridges will be constructed by slabs only. Therefore generation of turbidity plumes and sedimentation which could impact aquatic organisms can be excluded. No impacts are expected on River ecology.	<ul style="list-style-type: none"> Not applicable
Air Quality	Air quality impacts from vehicle movements	Due to low traffic volumes no air quality impacts are expected during operational phase of the Project.	<ul style="list-style-type: none"> Not applicable
Noise	Noise from vehicles	<p>The project contains mainly rehabilitation of the existing road. No major realignment or implementation of an additional traffic lane is envisaged and therefore no entitlement for noise protection or compensation exists in accordance to Georgian laws and regulation.</p> <p>The comparison of existing noise levels and noise calculation results shows a slight decrease in noise levels after opening of the road due to better surface conditions. This effect will be offset in approximately 10 years due to the expected traffic increase.</p>	<ul style="list-style-type: none"> Not applicable

EMP Operational and Maintenance Phase Mitigation			
Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities
Geo-hazards	Continuous presence of geo-hazards	For general safety, geo-hazards should be continuously monitored and measures should be performed to prevent any hazardous incident.	<ul style="list-style-type: none"> • RD to monitor geo-hazard during the operational phase and provide measures to avoid occurrences of fatal incident.
Biological	Impacts to fauna Protecting BKNP Traffic Safety	Motorist should be notified by road signs of their possible presence and prohibit harming them Motorist should be notified by road signs of their proximity to BKNP <ul style="list-style-type: none"> • Traffic regulations should be enforced at all times • Traffic safety measures should be performed • Regular maintenance should be undertaken 	<ul style="list-style-type: none"> • RD to install signs where wildlife may be expected and prohibit harming them • RD to install signs to notify motorist of their proximity to the BKNP • Police should enforce traffic regulations • RD to install road safety signs and maintain the road

Annex 2 - Pre-Construction Baseline Measurements

Pre-Construction Baseline Measurements

EMP: Pre-construction Baseline Measurements					
Issue	Mitigation	Locations	Schedule	Responsibilities	Reporting
Water Quality Impacts due to construction works	The Contractor shall undertake baseline instrumental water quality measurements during the Pre-construction phase. Parameters to be monitored to establish a baseline include: <ul style="list-style-type: none"> • Total Suspended Solids (TSS) • Biological Oxygen Demand (BOD) • Fecal coliform • Oil and grease or Total Petroleum Hydrocarbon (TPH) 	Baseline monitoring locations include: <ul style="list-style-type: none"> • All locations where baseline measurements were done for the purpose of this IEE¹. These are at 2 sampling stations: • Station 4 is at a tributary of Chkherimela River; and Station 5 is the headwaters of Chkherimela River. 	Water quality baseline measurement shall be carried out before construction activities commence, as soon as possible after the acceptance of the Bid to determine current levels of the pollutants at the specified monitoring locations. Then measurements on a monthly basis during construction stage.	The Contractor shall engage a third party measuring contractor to undertake the baseline measurement and shall be approved by the by the Engineer and/or RD.	The measuring contractor shall provide his results to the Contractor and submitted to the Engineer prior to the start of Project works.

EMP: Pre-construction Baseline Measurements					
Issue	Mitigation	Locations	Schedule	Responsibilities	Reporting
Air quality	The Contractor shall undertake baseline instrumental air quality measurements for the following parameters: <ul style="list-style-type: none"> Dust (PM 10 and PM 2.5), 	<p><i>The recommended baseline monitoring locations include:</i></p> <ul style="list-style-type: none"> <i>All locations where baseline measurements were done in this IEE. In section 2 (east) this is</i> <i>Moliti Ambulatory (km 28+473)</i> <i>Moliti school (km 29+032)</i> <p><i>In addition at the Asphalt Plant location.</i></p>	Air quality baseline measurement shall be carried out before construction activities commence, asap after the acceptance of the Bid to determine current levels of the pollutants at the specified monitoring locations.	The Contractor shall engage a third party measuring contractor to undertake the baseline measurement and shall be approved by the by the Engineer and/or RD.	The measuring contractor shall provide his results to the Contractor and submitted to the Engineer prior to the start of Project works.
Noise	The Contractor shall undertake baseline instrumental noise measurements during the Pre-construction phase.	<p>The recommended baseline monitoring locations include:</p> <ul style="list-style-type: none"> All locations where baseline measurements were done in this IEE. In section 2 (east) these are at the following locations²: Moliti Ambulatory (km 28+473) Moliti school (km 29+032) 	Noise baseline measurement shall be carried out before construction activities commence, possibly as soon after the acceptance of the Bid to determine current levels of the pollutants at the specified monitoring locations.	The Contractor shall engage a third party measuring contractor to undertake the baseline measurement and shall be approved by the by the Engineer and/or RD.	The measuring contractor shall provide his results to the Contractor and submitted to the Engineer prior to the start of Project works.

²See coordinates of these sites in Table 10