Semi-annual Environmental Monitoring Report

Loan No GEO 3861-GEO

Reporting period: January - June 2020

Georgia: East-West Highway Khevi-Ubisa-Shorapani-Argveta Road,Section, F4 of the Shorapani-Argveta Improvement Project

Financed by the Asian Development Bank

Prepared by:	National Environmental External Monitoring Consultant Luiza Bubashvili
For:	Roads Department, Ministry of Regional Development and Infrastructure of Georgia (Executing Agency)
Endorsed by:	Levan Kupatashvili, Deputy Chairmen

July 2020

ACRONYMS & ABBREVIATIONS

ADB	Asian Development 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	Tobe Advised
TOR	Terms of Reference

Page

Table of Contents

Annexes:

1 INTRODUCTION

1.1 Preamble

1. This report represents the Semi – Annual Environmental Monitoring Review of construction of Section F4 forms the Shoropani – Argveta portion of the Khevi-Ubisa-Shorapani-Argveta section of the E60 Highway Project.

2. This report is the first Semi-Annual EMR for the project.

1.2 Headline Information

3. The Project Management Consultancy Services (PMCS) Company LTD “UBM” has been selected 11 May 2020 and the Project design review and construction activities have not been commenced yet.

2 PROJECT DESCRIPTION AND CURRENT ACTIVITIES

2.1 Project Description

4. The Project involves construction of a new road section of the E-60 highway located in Imereti Region of central Georgia (see Error! Reference source not found.). Section F4 forms the Shoropani – Argveta portion of the Khevi-Ubisa-Shorapani-Argveta section of the E-60. The length of the Project road is as follows:

- Right lane **(TA** – meaning Tbilisi – Argveta direction**)** - 14.778 km;
- Left lane **(AT** – meaning Argveta – Tbilisi direction**)** - 14.726 km.

5. The details of the proposed road project are:

6. Georgian National Standard SST 72: 2009 “Standard on Geometrical and Structural Requirements for the Public Motor Roads of Georgia” and TEM (Trans-European North-South Motorway) Standards.

7. The main technical parameters adopted in the detailed design are as follows:

- Design speed - 100 km/h;
- Number of traffic lanes – 4;
- Width of traffic lane - 3.75 m;
- Width of each carriageway - 7.5 m;
- Width of paved shoulder (emergency lane) - 2.5 m;
- Width of verge – 1.0 m;

- Width of central reserve- 5.0 m;
- Width of paved shoulder at the central reserve - 1.0 m;
- Total width of each paved platform – 11.0 m
- Width of road bed - 27.0 m;
- Carriageway cross-fall on straight sections - 2.5%;
- Minimum radius of horizontal curve - 400 m;
- Maximum longitudinal gradient - 4%;
- Minimum convex curve - 15 000 m;
- Minimum concaved curve - 15 000 m.

8. Five long span bridges and one short span bridge will be constructed during the project works.

9. The total length of the five bridges is 4,912 meters, the longest of which is 941 meters. The bridges are grouped into the following main typologies:

- Steel-concrete bridges - bridges 1,2,4: maximum span length up to 60 m for bridges 1 and 2 and up to 72 meters for bridges 4-AT and 4-TA.
- Precast concrete bridges – bridges 3 and 5: maximum span up to 34m.

10. Six tunnels will be constructed with double tubes with length from 399 m to 1166 m.

11. To construct the roadbed in the project section concrete retaining walls and reinforced concrete support structures will be required on several sections due to the difficult relief conditions of the project section.

12. Reinforced concrete retaining walls are required at the beginning of the project section from:

- KM 0.00 to KM 0.25
- KM 8.63 to KM 8.71
- KM 8.84 to KM 8.94

13. There are four interchanges planned in F4 Section.

14. The following types of culverts will be constructed:

- Underpasses for rural roads, which are construction of cast in situ reinforced concrete structures of closed contours cross sections 6.0x4.5 m - 6 units for passing rural roads is envisaged in the design.
- Cattle passes, which ensure cattle cross the project road. Construction of cast in situ reinforced concrete structures of closed contours cross sections 4.0x2.5 m - 4 units is envisaged in the design.
- Culverts, for which cast in situ reinforced concrete culverts cross section 2.0x2.5 m - 17 units, 4.0x2.5m - 2 units is envisaged in the design to provide water discharge from ravines and canals.

15. Eight underpasses will be constructed using reinforced concrete culverts.

16. One overpass will be constructed at km 11+854 with a length of 40 meters.

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

Fig. 1: Map of Project Road

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

19. The present Semi-annual Environmental Monitoring Report covers the period of January - June 2020.

2.2 Project Contracts and Management

20. The TOR for the Project Management Consultancy Services (PMCS) Company 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.

21. The Notice to Commence has not yet been given, and construction activity has therefore not commenced.

22. Construction Contractor is Guizhou Highway Engineering Group Co.LTD. was selected on 16 January 2020, contact details of project manager and environmental staff is given in the **Table 1** below.

Table 1: **Main Environmental and health and safety staff of ADB, CC, SC and RD**

Organization	**Position**	**Name**	**Nationality**
ADB	Head Office, Environmental Specialist, Portfolio, Results, Safeguards and Gender Unit (PSG), CWRD.	Nurlan Djenchuraev ndjenchuraev@adb.org	
	ADB/RETA International-Regional Environmental Safeguards Consultant	Keti Dgebuadze Tel: +995 322 250619 Mob: +995 577 232937 E-mail: ketdgeb@yahoo.com kdgebuadze.consultant @adb.org	Georgian
	Associate Safeguards Officer Georgia Resident Mission	Nino Nadashvili +995 595 070442 nnadashvili@adb.org	Georgian
Client/ Borrower	Environmental Specialist of RD	Luiza Bubashvili likabubashvili@yahoo.com 595 219 141	Georgian
	Head of Environmental Unit of RD	Gia Sopadze sopgia@gmail.com	Georgian

		599 939 209	
CSC	International Environmental Specialist	Kashif Bashir Cell: +995 558 151173 Email: bashir.kashif@gmail.com	Canadian
	Environmental and Health and Safety Expert	Amiran Shevardnadze Cell: +995 595334437 Email: datoshevardnadzebt@gmail.com	Georgian
Contractor	Project Manager	Zhou Chen gggg3bc@gmail.com	Chinese
	Environmental Specialist	David Kurdadze +995595116017	Georgian
	Health and Safety Specialist	Giorgi Karelidze 598580411	Georgian

2.3 Project Activities During Current Reporting Period

23. construction activities have not been commenced yet.

2.4 Description of Any Changes to Project Design

24. N/A

2.5 Description of Any Changes to Agreed Construction methods

25. N/A

3. ENVIRONMENTAL SAFEGUARD ACTIVITIES

3.1 General Description of Environmental Safeguard Activities

26. 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. CC's 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

27. N/A

3.3 Issues Tracking (Based on Non-Conformance Notices)

28. N/A

3.4 Trends

29. N/A

3.5 Unanticipated Environmental Impacts or Risks

30. N/A

4. RESULTS OF ENVIRONMENTAL MONITORING

4.1 Overview of Monitoring Conducted during Current Period

31. 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 (Baseline Measurements guidelines are given in **Annex 2**). According to the project EIA, periodic parametric mesurements of air, noise and water quality will be carried out by the constrution contractor, Monitoring to be undertaken monthly during construction period. Locations of measurements will be defined by the method statement for particular area.

4.2 Trends

32. N/A

4.3 Summary of Monitoring Outcomes

33. N/A

4.4 Material Resources Utilisation

34. N/A

4.4.1 Current Period

35. N/A

4.5 Waste Management

36. N/A

4.5.1 Current Period

37. N/A

4.6 Health and Safety

4.6.1 Community Health and Safety

38. N/A

4.6.2 Worker Safety and Health

39. N/A

4.6.3 Training

40. N/A

5. FUNCTIONING OF THE SEMP

5.1 SEMP Review

41. 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 SEMPs existing EMP will be used as a baseline document by CC (see **Annex 1)**.

GOOD PRACTICE AND OPPORTUNITY FOR IMPROVEMENT

6.1 Good Practice

42. Not yet applicable.

6.2 Opportunities for Improvement

43. Not yet applicable.

7. SUMMARY AND RECOMMENDATIONS

7.1 Summary

44. Not yet applicable.

7.2 Recommendations

45. The following activities are planned for the next reporting period:

- Construction Contractor to prepare the site-specific environmental management plans (SEMPs) before commencement of construction activities.
- 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, COVID-19 Outbreak Management Plan, etc. before commencement of construction activities.
- Construction Contractor to conduct baseline measurements of water, air and noise on regular bases before commencement of Construction activities.
- Carry out pre-construction survey of buildings and structures within 50 m distance from the highway.
- Conduct parametric measurements for air, water, noise and vibration during Q3-Q4 2020 reporting period.

ANNEXES:

Annex 1 – Environmental Management Plan

Environmental Management Plan - Detailed Design / Pre-construction Phase

Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities	Monitoring	Monitoring Responsibility & Schedule
Air Quality	Construction impacts	Preparation of an Air Quality Plan (AQP) which shall include the locations of haul routes.	• Contractor to prepare AQP • Engineer to review and approve AQP.	N/A	N/A
	Air quality impacts from stationary sources	• Locations for concrete batching plants require approval from the Engineer and MoEPA and all necessary permits. • All of the above facilities will also have the appropriate GoG permits and licenses. • No batching plant shall be located within 500 meters of any urban area or sensitive receptor.	• Contractor to select sites. • Engineer and MoEPA to approve sites.	N/A	N/A
Land Use	Loss of land and Property	Before the commencement of the construction works of the Project at any road, the RD must prepare the Land Acquisition and Resettlement Plan (the LARP), obtain the approval of ADB and then implement the plan and acquire the land.	• RD to prepare the LARP. • ADB to approve the LARP. • RD to implement the Plan. •	N/A	N/A
Climate Change	Damage to roads and drainage systems due to increased flooding and more intense rainfall.	As part of the detailed design, the following measures will be considered: • Increase ditch and culvert capacity; • Maintain positive cross slope to facilitate flow of water from surface; • Increase pavement resistance to rutting; • Reduce splashing/spray through porous surface mixtures; • More frequent use of elevated pavement section; • Improve visibility and pavement marking demarcation; and • Ensure that all embankments are seeded to help increase stability.	• Engineer to review design documents prior to the start of construction and make any additions as necessary.	N/A	N/A
Soils	Loss of Agricultural Soils	Before the commencement of the construction works of the Project at any road, the RD must prepare the Land Acquisition and Resettlement Plan (the LARP), obtain the approval of ADB and then implement the plan and acquire the land.	• RD to prepare the RAP. • ADB to approve the RAP.	N/A	N/A

			• RD to implement the Plan.		
	Soil Erosion	Measures to control erosion will be outlined in the Contractors Clearance, Re-vegetation and Restoration Management Plan.	• Contractor to prepare plan. • Engineer to review and approve plan.	N/A	N/A
	Spills and Leaks of Liquids	Develop a spills response plan, including a spill log for all spills over 1 liter.	• Contractor to prepare plan. • Engineer to review and approve plan.	N/A	N/A
	Soil contamination	• Analysis of four additional soil samples taken close to the GAA. • Addendum to this EIA including the results of the additional soil samples.	• Engineer to hire a licensed laboratory for the analysis. • Engineer to provide the results in an addendum to this EIA	ADB	Before the start of construction.
Hydrology	Bridge Construction	• Preparation of a Bridge Construction Plan prior to the starting of works at any bridge construction site. The Plan shall include items relating to the construction schedule, construction techniques, work areas, equipment use, siting of hazardous liquids and waste materials, provision of coffer dams, fish spawning periods, results of any other fauna surveys, e.g. for otters, procedures for fueling of vehicles, sediment management, methods to reduce turbidity, OHS measures, etc. The Plan shall also contain a specific Spill Response Procedure relating to the management and clear up of spills in these areas.	• Contractor to prepare the Plan. • Engineer to review and approve plan.	N/A	N/A
		• All new bridges shall be designed for the life expectancy of 100 years. • A design discharge of 100 years return period is considered for bridges. • Bridge designs shall ensure that drainage from bridge decks over 50 meters does not discharge directly to the watercourses beneath the bridges. • The bridge run-off waters shall lead to an interceptor tank, or filter pond adjacent to the bridge in order to trap oil and grease run-off and prevent pollution of surface water courses. • The bridges shall be designed with dry paths under the bridge on either side of the streams	• DD Consultants • Engineer to review design documents prior to the start of construction. •	N/A	N/A

		to facilitate movements of people, livestock and wildlife. • The bridge design and layout must be aesthetically pleasing and in harmony with the existing environment.			
		• Establish the fish spawning period in relation to the bridge construction works to ensure that all works are undertaken in periods least likely to affect the fish spawning period.	• Contractor to consult with MoEPA regarding fish spawning periods. • Contractor to inform Engineer of any periods of construction restriction based on the consultations with MoEPA.	N/A	N/A
	Culverts	A design discharge of 50 years return period is considered for culverts.	• DD Consultants • Engineer to review design documents prior to the start of construction.	N/A	N/A
	Drainage	Include the use of oil separators within the road drainage system to capture any spills of oil / fuel and also to filter hydrocarbon run-off from the road in general.	• DD Consultants	N/A	N/A
	Tunneling	Contractor shall develop a ground water management plan for each tunnel under which shall be submitted for approval by the Engineer at least four weeks prior to the start of tunnelling works.	• Contractor to prepare plan. • Engineer to review and approve plan.	N/A	N/A
	Siting of facilities	• No construction camp, permanent or temporary, shall be located within 500 meters of any river, or irrigation channel (not including drainage channels) including the Dzirula, Kvirila and Borimela rivers. • Contractor to prepare Camp Management Plan including the hydrology management measures outlined in this EIA.	• Contractor to select sites. • Engineer and MoEPA to approve sites.	N/A	N/A
Biodiversity	Land clearance	• The Contractor shall prepare a Clearance, Re-vegetation and Restoration Management Plan for prior approval by the Engineer. The Clearance Plan shall be followed strictly by the contractor. Areas to be cleared should be minimized as much as possible. • As part of this plan prepare an action plan for the restoration of habitat that will be cleared prior to the start of construction. The plan	• Contractor to prepare and implement Plan. • Engineer to review and approve plan. • Contractor to survey trees for vulnerable species.	N/A	N/A

		shall be prepared by qualified biodiversity specialists. • The plan shall include restoration of the existing site, re-planting of spoil disposal site and re-planting at any other locations requested by MoEPA. • Prior to the commencement of works the Contractor shall stake the boundary of the entire site, including intersections and areas under bridges. The Contractor will then undertake a survey of all trees within 5 meters of the boundary of the staked site and identify if any Georgian red-list species are located within this zone. This survey will form part of the Contractors Clearance, Re-vegetation and Restoration Management Plan. • All temporary construction facilities should be located on already heavily disturbed ground where secondary forest growth has not yet become well-established.			
	Tree cutting	• The LARP shall contain the compensation methods and payments for loss of trees on private land.	• RD to prepare the LARP. • ADB to approve the RAP. • RD to implement the Plan.	N/A	N/A
	Impacts to Otter habitat	• Prior to the start of construction in river beds, or close to river embankments (within 10 meters), the Contractor shall undertake a site survey (using a local ecologist) to ensure that there are no otter holts in these areas. If holts are found in these areas the Contractor will prepare a method statement for the management of these areas which will be sent to the Engineer for review and approval.	• Contractor to perform site surveys with qualified specialists. • Contractor to prepare method statements for any affected areas. • Engineer to review and approve method statements.	N/A	N/A
	General impacts to fauna	• Prior to the clearing of vegetation at any site (and prior to works in in existing tunnels and at bridge sites) the Contractor will undertake site surveys of the area to be cleared using national biodiversity specialists.	• Contractor to undertake site surveys using qualified specialists.	N/A	N/A
	State Forest Fund	• Prior to cutting trees in the identified State Forest Fund areas, it is required to obtain permit (Decree of the Government of Georgia on the "exclusion of certain areas from the State Forest Fund"), also known as 'delisting' the trees from the State Forest Fund and for compensation payments to be made.	• RD to obtain permit and submit to Engineer for review. • Engineer to review permit. • RD to make compensation payments.	N/A	N/A

	Impacts to Protected Areas	• No haul route will pass through a protected area.	• Contractor to implement mitigation.	N/A	N/A
	Impacts to birds from street lighting	• Ensure that lower wattage lamps are used in street lights which direct light downwards to reduce glare.	• DD Consultants to incorporate the measures.	N/A	N/A
Construction Camps	Selection of Construction Camp Site	• Screening of camp site location to determine significant environmental and social impacts during site selection. • Preparation of a Construction Camp Site Plan. • Preparation of a Spills Response Plan. • Construction camps shall not be located within one kilometer of an urban area and at least 50 meters from any surface water course and not within 2 kilometers of a protected area. • Coordinate all construction camp activities with neighboring land uses.	• Contractor to screen site and provide screening report to the Engineer and RD. • Engineer and RD to approve camp locations. • Engineer to review & approve Plans.	N/A	N/A
Transportation and Utilities	Damage to roads	• Prior to the commencement of works a road condition survey will be undertaken to record the condition of access roads to asphalt plants, camps, etc.	• Engineer to complete road condition survey. • Contractor to review and agree to the findings of the road condition survey.	N/A	N/A
	Traffic management	• Preparation of a traffic management plan as part of the SEMP. • School Safety Sessions will be completed by the Contractors H&S team and community liaison on 6-month basis throughout construction and an initial session prior to start of works to provide road safety awareness to children. During these sessions the school children shall also be provided with reflective badges to fit to clothing or school bags.	• Contractor to prepare plan. • Engineer to review and approve plan.	N/A	N/A

Occupational Health and Safety	Worker Health and Safety	• Prepare an Occupational Health and Safety Plan (OHS Plan). • Ensure that sub-contractors are provided with copies of the SEMP and that they adhere to the content of the SEMP.	• Contractor to prepare OHS Plan. • Contractor to provide copies of the SEMP to sub-contractors prior to their access to the site. • Engineer to review and approve OHS Plan.	N/A	N/A
	Traffic Safety	Submit a Traffic Management Plan (TMP) to local traffic authorities prior to mobilization.	• Contractor to prepare TMP. • Engineer to approve TMP.	N/A	N/A
Emergency Response	Fires, explosions, earthquake, etc.	Preparation of an Emergency Response Plan (ERP).	• Contractor to prepare ERP • Engineer to review and approve ERP.	N/A	N/A
Waste Management	Management of waste materials	• Preparation of a waste management plan, including measures to re-use and recycle wastes and measures to dispose of hazardous waste. • Preparation of a construction camp management plan to manage liquid wastes.	• Contractor to prepare Plans • Engineer to review and approve Plans.	N/A	N/A
	Tunnel and Embankment Spoil	• Consultations between Kutaisi Bypass Contractor and RD to determine if the static balance from F4 can be re-used as embankment material for Kutaisi Bypass. • Preparation of a Spoil Re-use and Disposal Plan.	• Contractor to consult with RD and Kutaisi Bypass Contractor. • Contractor to prepare plan. • RD and Engineer to review and approve the plan.		
PCR	Chance Finds	The Contractor shall prepare a chance find procedure in line with the requirements of the GoG. **Appendix E** provides a sample procedure.	• Contractor to prepare Plans • Engineer to review and approve Plans.	N/A	N/A
Noise	Noise barriers	Include areas for the installation of the identified noise barriers in **Error! Reference source not found.** in the Project detailed design.	• Detailed Design Consultant.	N/A	N/A
Vibration	Construction vibration	The Contractor will develop a detailed Tunnel Blasting Plan (TBP) as part of the overall construction schedule.	• Contractor to prepare Plans • Engineer to review and approve Plans.	N/A	N/A
SEMP Requirement	Preparation of SEMP	Prepare SEMP.	• Contractor to prepare SEMP.	N/A	N/A

			• Engineer to review and approve SEMP.		
	Incorporation of Items into Bid Documents	A specific environmental and social section shall be included within the main Bid Documents indicating that the Contractor shall be responsible for conforming with the requirements of this EMP.	RD to ensure EMP is included within Bid Documents.	N/A	N/A
Project Awareness	Stakeholder Awareness	Prior to start of site works residents, business representatives in the project area, local authorities and other stakeholders, including NGOs, who are likely to be affected by the project or are interested in the project) shall be informed on the construction schedule and activities, potential environmental impacts and mitigation measures through public meetings at each affected community.	RD to undertake public meetings.	N/A	N/A
	GRM	Prior to start of site works, the Contractor shall: • Communicate the GRM to communities in the project impact zone. • Set-up and publicize a 24-hour hotline for complaints. • Ensure that names and contact numbers of representatives of GRCE and the Contractor are placed on the notice boards outside the construction site.	Contractor	N/A	N/A

Subject	Potential Impact / Issue	Mitigation Measure	Responsibilities	Monitoring	Monitoring Responsibility & Schedule
Air Quality	Open burning of waste materials	No burning of debris or other materials will occur at any camp or construction site.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
	Rock-crushing plant	• Rock crushing plant equipment shall be fitted with water sprinklers that will run continuously while the plant is operational. • If the sprinklers stop working, the plant shall also cease operation until the sprinklers are functioning. • Water run-off from the sprinkler system shall not discharge directly to surface water courses without first passing through a silt trap or any other suitable device to prevent siltation of surface waters.	• Contractor to implement mitigation. • Engineer to routinely monitor Contractors activities.	Engineers NES	Daily site inspections, throughout construction period.
	Exhaust emissions from the operation of construction machinery	• 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. • Construction equipment will be maintained to a good standard and fitted with pollution control devices regularly monitored by the Contractor and Engineer.	• Contractor to implement mitigation. • Engineer to routinely monitor Contractors activities.	Engineers NES	Daily site inspections, throughout construction period.
	Emissions from Construction vehicles.	Emissions from on-road and off-road vehicles should comply with national or regional programs. In the absence of these, the following should be considered: • Regardless of the size or type of vehicle, owners / operators should implement the manufacturer recommended engine maintenance programs. • Drivers should be instructed on a routine basis by the Contractors EM on the benefits of driving practices that reduced both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits. • Implement a regular vehicle maintenance and repair program.	• Contractor to implement mitigation. • Engineer to routinely monitor Contractors activities including vehicle maintenance records.	Engineers NES	Daily site inspections, throughout construction period. Annual inspection of vehicle maintenance records.

	Fugitive emissions.	• Conveyor belts (e.g. at batching plants and rock crushing plants) shall be fitted with wind-boards, and conveyor transfer points and hopper discharge areas shall be enclosed to minimize dust emission. • All trucks used for transporting materials to and from the site will be covered with canvas tarpaulins. • Carry out watering for dust control at least 3 times a day: in the morning, at noon, and in the afternoon during dry weather with temperatures of over 25C, or in windy weather. Avoid overwatering as this may make the surrounding muddy. • Earthwork operation to be suspended when the wind speed exceeds 20 km/h in areas within 500 m of any community.	• Contractor to implement mitigation. • Engineer to routinely monitor Contractors activities.	Engineers NES	Daily site inspections, throughout construction period.
Soils Erosion and Soil Contamination	Contamination of Soils	• All fuel and chemical storage will be sited on an impervious base within a bund and secured by fencing. • The storage area will be located away from any watercourse or wetlands. • The base and bund walls will be impermeable and of sufficient capacity to contain 110% of the volume of tank (or one tank if more than one tank is located in the bund). • The construction camp maintenance yard will be constructed on impervious hardstanding with adequate drainage to collect spills (including oil interceptor tanks), there will be no vehicle maintenance activities on open ground. • Filling and refueling will be strictly controlled and subject to formal procedures. • Drip pans will be placed under all filling and fueling areas. Waste oils will be stored and disposed of by a licensed contractor. • All valves and trigger guns will 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 will be clearly marked. Measures will be taken to ensure that no contaminated discharges enter any soils. • No bitumen drums or containers, full or used, will be stored on open ground. They will only be stored on impervious hardstanding.	• Contractor to implement mitigation. • Engineer to review and approve bunding prior to the start of construction. • Engineer to review and approve vehicle fueling area prior to the start of construction.	Engineers NES	Daily site inspections, throughout construction period.

		• Areas using bitumen will be constructed on impervious hardstanding to prevent seepage of oils into the soils. • No bitumen drums or containers, full or used, will be stored on open ground. They will only be stored on impervious hard standing. • Areas using bitumen will be constructed on impervious hard standing to prevent seepage of oils into the soils.			
	Loss of topsoil	• Locate topsoil stockpiles outside drainage lines and protect stockpiles from erosion. • Construct diversion channels and silt fences around the topsoil stockpiles to prevent erosion and loss of topsoil. • Rip ground surface prior to the spreading of topsoil. • Remove unwanted materials from topsoil such as roots of trees, rubble and waste etc. • Specifically regarding soil compaction, the Contractor will confine operation of heavy equipment within the RoW, as much as possible, to avoid soil compaction and damage to privately owned land. • If in case private lands are disturbed, the contractor should promptly inform the owner and agree on the ways to remedy the situation.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
	Soil Erosion	• Material that is less susceptible to erosion will be selected for placement around bridges and culverts. • Re-vegetation of exposed areas including; (i) selection of fast growing and grazing resistant species of local flora; (ii) immediate re-vegetation of all slopes and embankments if not covered with gabion baskets; (iii) placement of fiber mats to encourage vegetation growth. • The Engineer and the Contractor will both be responsible for ensuring that embankments are monitored continuously during construction for signs of erosion.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
	Contaminated Land	Should the results of the additional soil sampling in the pre-construction phase indicate any elevated levels of contamination further testing of the excavated soils in this area will be required. The procedure for any construction phase testing is as follows:	• Contractor to implement mitigation. • Engineer to hire certified laboratory and review results. • Engineer to undertake periodic inspections of	Engineers NES	Weekly inspections of stockpiles.

		• identify a temporary storage area for material excavated from the area identified in this EIA. The area should be fenced and signposted. The area shall comprise an impermeable surface to prevent leachate from the stockpiles potentially contaminating soils and groundwater in the area of the storage area. • strip the topsoil in the area of the contaminated areas in batches of 2,500 m^2 and store the mixed material in the temporary storage area (the stockpile). The height of the stockpile shall be no more than 2 meters. It is possible to have more than one stockpile, depending upon the rates of excavation in this area. • divide the stockpile into quadrants of 250m^3. • hire a certified laboratory to take a soil sample from each of the quadrants for further chemical analysis (a stockpile of 2,500m^3 would require 10 samples). Sampling should be uniformly distributed throughout the stockpile, including sampling at depth. • If the results show the all of the samples are within the proposed national limits and the Dutch target values the material can be removed from the stockpile area and disposed of as non-hazardous material. • If any of the ten samples show elevated levels of contamination the material from the respective contaminated quadrants will be disposed of as hazardous waste. Any other non-contaminated quadrants may be disposed of as non-hazardous waste. • Final disposal of any contaminated soil must be undertaken at a waste management facility licensed to handle such wastes. As with normal waste materials, the Contractor will be obliged to keep records of any hazardous materials removed from the site, including: o Volume of soil removed; o Details of any identified contamination; o Soil stockpile (and/or storage container) unique identifier; o Date excess soil was excavated from each location and subsequently transported to a disposal facility; o Details of the vehicle transporting the soil to a disposal facility;	the stockpiles to ensure the correct procedures are being followed.		

		○ Details of the disposal facility; and ○ Date the excess soil arrived at the disposal facility. ○ provide a copy of the licensed waste management contractors contract to the Engineer before any contaminated soil is removed from the site. • The Engineer will also be responsible for undertaking an additional due diligence review of the waste management contractors disposal site.			
		Alternative treatment of contaminated land prior to disposal	• Contractor responsible for the preparation of a Contaminated Spoil Treatment Plan. • Plan approved by the Engineer. • Contractor to implement treatment measures and disposal. • Engineer to undertake periodic review and assessment of the activity and results.	Engineers NES	Weekly inspections of any proposed treatment activity.
Hydrology	Ground and surface water pollution.	• Implementation of the specific mitigation measures outlined under Construction Camps, below and Soil Contamination above. • Provide portable toilet facilities for workers at road work sites.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
	Groundwater depletion	• Routine monitoring of groundwater levels in groundwater wells in the Project area will be undertaken on a weekly basis by the Contractor within the vicinity of each tunnel he is excavating, in line with his groundwater management plan. The monitoring shall continue for a two month period after the tunnel is sealed. If drawdown levels in wells are significant the Contractor will provide a temporary source of potable water to the affected persons until the groundwater levels are recharged. • Monitoring shall continue for a two month period after the completion of the tunnels. If	Contractor to implement mitigation	Engineers NES	Weekly review of groundwater monitoring reports.

		the wells fail to re-charge, new boreholes will be constructed for affected persons.			
	Bridges	The Contractor will: • Provide spill kits in worksites around rivers. • Ensure no vehicle refueling occurs within 50 meters of any surface water course. • Divert the water flow near the bridge piers. • Provide coffer dams, silt fences, sediment barriers or other devices to prevent migration of silt during construction within streams. • Perform dewatering and cleaning of cofferdams to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. • Carry out bridge construction works without interrupting the traffic on the existing road with the provision of suitable diversions. • Ensure no waste materials are dumped in the river, including re-enforced concrete debris. • Place generators more than 20 meters from the river. • Ensure that no concrete waste from concrete mixers is dumped in the river. • Provide areas where concrete mixers can wash out leftover concrete without polluting the environment. This may be in the form of a lined settling pond at each bridge site. Drivers will be informed of these locations and the requirements to use these settling ponds on a routine basis by the Engineer. Dried waste from the settling ponds can be used as backfill for culverts, etc. • Carefully collect all polystyrene (from expansion joints) so that it does not litter the local environment. • Ensure that no hazardous liquids are placed within 10 meters of the river. • Provide portable toilets at bridge construction sites to prevent defecation by workers into the river. • Ensure that workers are provided with correct PPE including harnesses. • During piling works ensure that pumped water is filtered through a silt trap before being discharged to the river. • In addition, the Contractor, through his Environmental Manager, will be responsible for consulting with MoEPA to establish the	Contractor to consult with MoEPA and provide copies of letters confirming construction periods to the Engineer.	Engineers NES	Routine monitoring of bridge works to ensure they are in compliance with MoEPA guidelines.

		fish spawning period in relation to the bridge construction works to ensure that all works are undertaken in periods least likely to affect the fish spawning period.			
	Drainage and Flooding	• During the construction phase the Contractor will be required to construct, maintain, remove and reinstate as necessary temporary drainage works and take all other precautions necessary for the avoidance of damage to properties and land by flooding and silt washed down from the works. • Arrange with the village representatives those works which might interfere with the flow of irrigation waters to be carried out at such times as will cause the least disturbance to irrigation operations. • Should any operation being performed by the Contractor interrupt existing irrigation facilities, the Contractors will restore the irrigation appurtenances to their original working conditions within 24 hours of being notified of the interruption. • The Contractor will also be responsible for ensuring that no construction materials or construction waste block existing drainage channels within the Project corridor.	Contractor to implement mitigation.	Engineers NES	Monitor drainage channels on a weekly basis.
	Dewatering of tunnels	The Contractor will pass all drainage water from the tunnel through a settlement tank. Weekly monitoring of the water quality from the tank will be undertaken by the Contractor to assess for any pollution. If the drainage water meets drinking water standards it can be considered for re-use in any potentially depleted wells during the construction phase.	• Contractor to implement mitigation. • Engineer to review and approve settlement tank locations and designs.	Engineers NES	• Review of weekly water monitoring results. • Weekly inspection of settlement tanks.
	Water Supply	Only legally permitted water resources shall be used for technical water supply, including rivers. All permits and licenses for water supply and discharge will be obtained prior to use.	• Contractor to implement mitigation. • Engineer to review all water extraction permits.	Engineers NES	• Weekly inspections, throughout construction period. • Annual review of permits.
Biodoversity	Tree cutting	• Trees cleared from private land plots will be compensated in accordance with the Land Acquisition and Resettlement Plan (LARP).	GoG to implement the LARP.	According to the LARP	According to the LARP

		• Tree cutting shall not occur during bird nesting seasons.			
	State Forest Fund	• The Contractor will be provided with plans indicating the areas of State Forest Fund. • Tree-cutting works in the State Forest Fund areas shall be implemented under the supervision of specialists of the National Forestry Agency. • Contractor to remove the trees to a location specified by the National Forest Agency.	• RD to provide plans to Contractor. • Contractor to undertake tree cutting. • Contractor to remove trees.	National Forestry Agency	None
	Tree Re-planting	• Coordinate with the National Forest Agency to identify a site, or sites, within the Project area where 615 red-list species can be re-planted. • Plant maintenance will be carried out for at least two years. • Monthly monitoring of the re-planted areas and report on the success rate of the re-planted trees, which should be above 80%. • If the success rate falls below 80% re-plant on a 1:1 basis to compensate for losses.	• Contractor to coordinate with NFA. • Contractor to purchase, plant and maintain the seedlings. • Contractor to plant additional seedlings if success rate not met.	Engineer to monitor success rate (NFA to determine success rate criteria).	Monthly monitoring of success rate.
	Protection of Vulnerable Species	The Contractor will place protective wood fencing around the any Georgian red-list species identified within 5 meters of the site boundary in the pre-construction survey in order to protect the tree during construction works, including its root zones.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
	Vegetation clearance	No chemicals shall be used to clear vegetation.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
	Otters	• Implement method statements for otter protection. • If live otters are encountered Contractor is to cease work and contact the ecologist who will then liaise with the appropriate regulatory officers to discuss the encounter and how best to proceed from that point. • Ensure the measures outlined in **Error! Reference source not found.** are followed.	Contractor to implement mitigation.	Engineers NES	Review of method statements. Daily inspections of Contractors works at the bridge sites.
	Other IUCN / GRL species	• Ensure the measures outlined in **Error! Reference source not found.** are followed.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.

	Bats, Birds and Other non special status fauna.	• Ensure mitigation measures outlined in **Section G.6.1 Biodiversity** are followed If bats and other fauna are found during pre-construction site surveys. • Ensure the measures outlined in **Error! Reference source not found.** are followed.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
	Poaching	• Poaching of wildlife shall be strictly prohibited. • The Contractor will be responsible for providing training sessions to his workers relating to environmental protection (including the ban on poaching).	Contractor to implement mitigation.	N/A	N/A
	Fish Spawning	The Contractor shall consult with the MoEPA to determine when works in rivers should be ceased in order to limit impacts to fish spawning periods.	Contractor to implement mitigation.	Engineers NES	Review of documentation provided by MoEPA.
	Impacts to habitat	Prior to the start of construction in river beds, or close to river embankments (within 10 meters), the Contractor shall undertake a site survey (using a local ecologist) to ensure that there are no otter burrows in these areas. If burrows are found in these areas the Contractor will prepare a method statement for the management of these areas which will be sent to the Engineer for review and approval.	Contractor to hire local ecologist. Contractor to prepare method statement. Engineer to review and approve method statement.	Engineers NES	Review method statement and periodically monitor works in this area.
Waste Management and Spoil	Recycling and re-use	• Where possible, surplus materials will be reused or recycled. • Used oil and grease shall be removed from site and sold to an approved used oil recycling company.	Contractor to implement mitigation.	Engineers NES	Monthly review of waste manifests to determine if wastes are being recycled.
	Spoil	• Follow the Spoil Disposal Plan prepared for the Project, including restoration of the site according to the plan. • Under no circumstances shall the Contractor dump excess materials on private lands. • Excess spoil shall not be dumped or pushed into any river at any location. • Spoil re-use and disposal haul routes shall be included within the traffic management plan. • The Contractor will be responsible for upgrading and maintenance of any locals roads used for the transport of spoil materials. • Transport of spoil material from tunnels on local roads shall be prohibited between 10pm and 6am. • Routine spraying of haul routes during dry periods.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.

	Inert Solid & Liquid waste	• Provide refuse containers at each worksite. • Maintain all construction sites in a cleaner, tidy and safe condition. • Waste storage containers shall be covered, tip-proof, weatherproof and scavenger proof. • Train and instruct all personnel in waste management practices and procedures. • Collect and transport non-hazardous wastes to all approved disposal sites. • Keep copies of waste manifests on site. • Keep a record of waste on-site and waste removed.	• Contractor to implement mitigation and conduct training. • Engineer to approve any waste disposal site.	Engineers NES	Daily site inspections, throughout construction period. Regular review of Contractors training sessions.
	Asphalt and Concrete	• Waste asphalt will be recycled where possible for base material and shoulder material. • Unused or rejected tar or bituminous products shall be returned to the supplier's production plant. • Waste concrete shall be crushed and re-used as fill material, or base material where possible. • Under no circumstances should concrete mixers be washed out onto open ground at construction sites, such as bridges.	Contractor to implement any recommendations for re-use of asphalt. Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
	Hazardous Waste	• Storage of hazardous waste shall be in specific secure locations as identified by the waste management plan. • Hazardous liquids must be stored within impermeable bunds (the bund should be able to contain at least 110% of the volume of the largest storage tank within the bund). • Collect and temporarily store used hazardous waste separately in specialized containers and place in safe and fire-free areas with impermeable floors roofs, at a safe distance from fire sources and according to the requirements of their MSDS. • Training and suitable PPE will be provided to all personnel handling hazardous waste. • Disposal of waste materials shall be undertaken by a licensed waste management company. Keep copies of the companies licenses on record as well as the agreements with the company. • Keep records of the types and volumes of waste removed from the site on a weekly basis. • Keep copies of waste manifests.	• Contractor to implement mitigation. • Engineer to approve any waste disposal site. • Engineer to review waste manifests.	Engineers NES	Daily site inspections, throughout construction period. Monthly review of waste manifests.

Transport and Utilities	Transportation	The Contractor will: • Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions at least 24 hours before the disruptions; • Allow for adequate traffic flow around construction areas via diversions or temporary access roads; • If temporary access roads are to be constructed with a gravel surface they shall be routinely watered by the Contractor during dry weather to reduce dust impacts; and • Provide adequate traffic signs, appropriate lighting, well-designed traffic safety signs, barriers and flag persons for traffic control. • Access roads for batching plants, etc, will be maintained during the construction phase and rehabilitated at the end of construction.	Contractor to implement mitigation.	Engineers NES	Weekly inspections, throughout construction period.
	Working Close to Railways Lines	The Contractor will be responsible for the preparation of an Environmental, Health and Safety Method Statement for working in the area above the railway line at KM 6.3 and at Bridge BR 4.0.1.AT/TA.	• Contractor to prepare method statements. • Engineer to review and approve method statements	Engineers NES	Weekly monitoring of works in these areas.
	Utilities	• All utilities in the Project area shall be kept operational, particularly during the winter months. • The Contractor will be responsible for liaising with the relevant utilities operators to ensure all utilities remain operational. • Should utilities need relocating in a different location the Contractor will consult with the relevant utilities and local community to ensure that there is no change in supply as a result of these changes.	Contractor to implement mitigation.	Engineers NES	Weekly inspections, throughout construction period.
Asphalt Plants	Emissions & Noise	• Asphalt plants will be located downwind of urban areas and not within one kilometer of any urban area. • Adequate PPE will be provided to staff working in areas of high noise and emissions. • Storage and Use of Hazardous Materials (including bitumen): • Ensure all hazardous materials are stored (including within suitable sized bunds for liquids), handled and disposed of according to their Material Safety Data Sheet (MSDS). • Copies of MSDS will be kept on site with all hazardous materials.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period. Monthly review of hazardous waste log.

		• The Contractor will keep a log of the type and volume of all hazardous wastes on site. • The Contractor will keep a plan of site indicating where all hazardous materials are stored.			
	Vehicle Movement	The Contractor will include the asphalt plant in his Traffic Management Plan, including haul routes from the plant.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
	Health and Safety	• To prevent bitumen burns it will be compulsory for the workers handling hot bitumen to wear full-body protection. • All transportation, handling and storage of bitumen will be handled safely by experienced personnel. • The dust from the manufacturing process may pose respiratory hazards, hence protective air mask will be provided to the operators for the loading and unloading of aggregates. • Ear-muffs will be provided those working on the plant. • First Aid kit will be available on site for the workers in case of emergency. • The Material and Data Sheet (MSDS) for each chemical product will be made accessible onsite and displayed.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.
Construction Camps	Pollution and Emissions	• The Contractor will ensure that all of the following conditions are met: • Rain-water run-off arising on the site will be collected, removed from the site via a suitable and properly designed temporary drainage system and disposed of at a location and in a manner that will cause neither pollution nor nuisance. The drainage system will be fitted with oil and grease interceptors. • There will be no direct discharge of sanitary or wash water to surface water. • In the absence of functioning sewerage and sewage treatment facilities it is recommended that the Contractor provides his own on-site wastewater treatment facilities. For sites servicing a small number of employees (less than 150), septic tanks may be used. For larger sites, liquid wastes will as a minimum receive primary treatment in anaerobic tank or pond preceded by a bar screen to remove large solid objects (e.g. sticks, rags).	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.

		• There will be no direct discharge of untreated sanitary or oily wastewater to surface water bodies. • Licensed contractors will be required to collect and disposal of liquid waste from the septic tanks on regular basis. • Disposal of materials such as, but not limited to, lubricating oil and onto the ground or water bodies will be prohibited. • Liquid material storage containment areas will not drain directly to surface water. • Waste water from vehicle washing bays will be free of pollutants if the wash bay has been constructed correctly. • Lubricating and fuel oil spills will be cleaned up immediately and spill cleanup materials will be maintained at the storage area. • Construction and work sites will be equipped with sanitary latrines that do not pollute surface waters and are connected to septic tanks, or waste water treatment facilities. • 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. • Washing out concrete trucks at construction sites will be prohibited unless specific concrete washout areas are provided for this purpose at the construction site (e.g. a bridge site). The washouts will be impermeable and emptied when 75% full. • Spill cleanup equipment will be maintained on site (including at the site maintenance yard and vehicle fueling areas). The following conditions to avoid adverse impacts due to improper fuel and chemical storage: • Fueling operations will occur only within containment areas. • All fuel and chemical storage (if any) will be sited on an impervious base within a bund and secured by fencing. The storage area will be located away from any watercourse or wetlands. The base and bund walls will be impermeable and of sufficient capacity to contain 110% of the volume of tanks. • Filling and refueling will 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 will 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 will be clearly marked. Measures will 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 cleanup will be undertaken and all cleanup materials stored in a secure area for disposal to a site authorized to dispose of hazardous waste. • If determined warranted by the Engineer, the Contractor will provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from the sites. • If so requested, the Contractor will ensure that all vehicles are properly cleaned (bodies and tires are free of sand and mud) prior to leaving the site areas. • The Contractor will provide necessary cleaning facilities on site and ensure that no water or debris from such cleaning operations is deposited off-site. • The Contractor will be responsible to maintain and cleanup campsites and respect the rights of local landowners.			
Concrete Batching Plants	Pollution and Emissions from Concrete Batching Plants	To limit impacts from dust, the following conditions will apply: • Batching plants will be located downwind of urban areas and not within one kilometer of any urban area. • The entire batching area traversed by vehicles – including driveways leading into and out of the area – will be paved with a hard, impervious material. • Sand and aggregates will be delivered in a dampened state, using covered trucks. If the materials have dried out during transit they will be re-wetted before being dumped into the storage bunker.	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout construction period.

		• Sand and aggregates will be stored in a hopper or bunker which shields the materials from winds. The bunker should enclose the stockpile on three sides. The walls should extend one metre above the height of the maximum quantity of raw material kept on site, and extend two metres beyond the front of the stockpile. • The hopper or bunker will be fitted with water sprays which keep the stored material damp at all times. Monitor the water content of the stockpile to ensure it is maintained in a damp condition. • Overhead storage bins will be totally enclosed. The swivel chute area and transfer point from the conveyor will also be enclosed. • Rubber curtain seals may be needed to protect the opening of the overhead bin from winds. • Conveyor belts which are exposed to the wind and used for raw material transfer will be effectively enclosed, to ensure dust is not blown off the conveyor during transit. Conveyor transfer points and hopper discharge areas will be fully enclosed. • Conveyor belts will be fitted with belt cleaners on the return side of the belt. • Weigh hoppers at front end loader plants will be roofed and have weigh hoppers shrouded on three sides, to protect the contents from the wind. The raw materials transferred by the front end loader should be damp, as they are taken from a dampened stockpile. • Store cement in sealed, dust-tight storage silos. All hatches, inspection points and duct work will be dust-tight. • Silos will be equipped with a high-level sensor alarm and an automatic delivery shut-down switch to prevent overfilling. • Cement dust emissions from the silo during filling operations must be minimised. The minimum acceptable performance is obtained using a fabric filter dust collector. • Totally enclose the cement weigh hopper, to ensure that dust cannot escape to the atmosphere.			

		• An inspection of all dust control components will be performed routinely – for example, at least weekly. • All contaminated storm water and process wastewater will be collected and retained on site. • All sources of wastewater will be paved and bunded. The specific areas that will be paved and bunded include; the agitator washout area, the truck washing area, the concrete batching area, and any other area that may generate storm water contaminated with cement dust or residues. • Contaminated storm water and process wastewater will be captured and recycled by a system with the following specifications: o The system's storage capacity must be sufficient to store the runoff from the bunded areas generated by 20 mm of rain. o Water captured by the bunds will be diverted to a collection pit and then pumped to a storage tank for recycling. o An outlet (overflow drain) in the bund, one metre upstream of the collection pit, will divert excess rainwater from the bunded area when the pit fills due to heavy rain (more than 20 mm of rain over 24 hours). o Collection pits should contain a sloping sludge interceptor, to separate water and sediments. The sloping surface enables easy removal of sludge and sediments. o Wastewater will be pumped from the collection pit to a recycling tank. The pit will have a primary pump triggered by a float switch and a backup pump which automatically activates if the primary fails. o Wastewater stored in the recycling tank needs to be reused at the earliest possible opportunity.			
Community Health and Safety	Blasting	Blasting will be conducted using standard mining industry practices and procedures to ensure safety of personnel and equipment. This includes establishing a safety zone around the blast area,	Contractor to implement mitigation.	Engineers NES	Daily site inspections, throughout

		say to a distance of 500 m (actual distance will be established by the Contractor and approved by the Engineer based on the safety standards) and evacuating it.			construction period.
	HIV / AIDS	Subcontract with an Approved Service Provider to provide an HIV Awareness Program to the Contractor's Personnel and the Local Community. Repeat the HIV Awareness Program at intervals not exceeding four months	Contractor to implement mitigation. Service Provider to implement training. Engineer to review program.	Engineers NES	Annual review of awareness program activities.
	School Safety	School Safety Sessions will be completed by the Contractors H&S team and community liaison on 6-month basis throughout construction and an initial session prior to start of works to provide road safety awareness to children. During these sessions the school children shall also be provided with reflective badges to fit to clothing or school bags.	Contractor to implement mitigation. Service Provider to implement training. Engineer to review program.	Engineers NES	Annual review of awareness program activities.
	Code of Conduct	The Contractor shall develop an induction program, including a Code of Conduct, for all workers directly related to the Project. A copy of the Code of Conduct is to be presented to all workers and signed by each worker.	Contractor to implement mitigation.	Engineers NES	Routine assessment of workers staff to determine if the code of conduct has been presented.
	Monthly Meetings	The Contractor will be responsible for holding monthly community meetings within the Project area throughout the construction period.	Contractor to implement mitigation.	Engineers NES	Engineers NES to attend all community meetings.
Occupational Health and Safety	Worker Health & safety	• Initial Safety Induction Course: All workmen will be required to attend a safety induction course before they are allowed access to the Site. • Develop a Safety Training Program including training to recognize and respond to workplace chemical hazards. • Keep a log of both training records and safety incidents including near misses. • Safety Meetings conducted on a monthly basis. • Regularly inspect, test and maintain all safety equipment. • Equipment, which is damaged, dirty, incorrectly positioned or not in working order, shall be repaired or replaced immediately. • All construction plant and equipment used on or around the Site shall be fitted with appropriate safety devices.	Contractor to implement mitigation. Engineer to review and approve training program.	Engineers NES	Daily site inspections, throughout construction period. Periodic attendance of training sessions to determine quality and numbers in attendance.

		• A fully equipped first aid base shall be provided at the Construction Camp and Asphalt Plant. • Coordinate with local public health officials and shall reach a documented understanding with regard to the use of hospitals and other community facilities. • Workers will be provided (before they commence works) with of appropriate PPE suitable for electrical work such as safety boots, helmets, gloves, protective clothes, goggles, and ear protection at no cost to the workers. • Provide portable toilet facilities for workers at road work sites. • Provide fencing on all areas of excavation greater than 2 m deep. Install warning signs. •			
	Sub-contractor H&S	• All sub-contractors will be supplied with copies of the SEMP. • Provisions to be incorporated into all sub-contracts to ensure the compliance with the SEMP. All sub-contractors will be required to appoint a safety representative who shall be available on the Site.	Contractor to provide SEMP. Sub-contractors to ensure compliance with SEMP	Engineers NES	Routinely monitor sub-contractors activities.
	Noise	Zones with noise level above 80 dBA must be marked with safety signs and appropriate PPE must be worn by workers.	Contractor to implement mitigation.	Engineers NES	Daily site inspections and monitoring (with smartphone technology) throughout construction period.
PCR	Impacts to Cemetery	During the construction phase the northern boundary of the cemetery (50 meters south of tunnel TUN 4.0.06-AT/TA) shall be fenced off to ensure that there is no encroachment into this area by construction workers or equipment.	Contractor to implement mitigation.	Engineers NES	Weekly site inspections of the fencing.
	Natural Spring	During the construction works the spring shall be fenced on the northern side to prevent construction works impacting upon the spring.	Contractor to implement mitigation.	Engineers NES	Weekly site inspections of the fencing.
	Impacts to Historical and archeological areas	In the event of any chance finds during the construction works procedures shall apply that are governed by GoG legislation and guidelines and as outlined in the Contractors Chance Find Procedure.	Contractor to implement mitigation.	Engineers NES	Daily site inspections throughout construction period.
Noise	Construction noise	During the construction phase the Contractor will be responsible for the following:	Contractor to implement mitigation.	Engineers NES	Daily site inspections throughout

		• Time and Activity Constraints, i.e., operations will be scheduled to coincide with periods when people would least likely be affected; work hours and work days will be limited to less noise-sensitive times. Hours-of-work will be approved by the Engineer having due regard for possible noise disturbance to the local residents or other activities. Construction activities will be strictly prohibited between 10 PM and 6 AM in the residential areas. When operating close to sensitive areas (within 250 meters) such as residential, nursery, or medical facilities, the Contractor's hours of working shall be limited to 8 AM to 6 PM; • Give notice as early as possible to sensitive receptors for periods of noisier works such as excavation. Describe the activities and how long they are expected to take. Keep affected neighbours informed of progress. • Within normal working hours, where it is reasonable to do so: o schedule noisy activities for less sensitive times. o provide periods of respite from noisier works (for example, periodic breaks from jackhammer noise). • The weekend/evening periods are important for community rest and recreation and provide respite when noisy work has been conducted throughout the week. Accordingly, work should not usually be scheduled during these times. • All mechanical plant is to be silenced by the best practical means using current technology. Mechanical plant, including noise-suppression devices, should be maintained to the manufacturer's specifications. Internal combustion engines are to be fitted with a suitable muffler in good repair. • Maintenance tools, machines and equipment so that they are in good conditions. When some wrong is found, they must be fixed immediately in order to reduce noise from the equipment. • Fit all pneumatic tools with an effective silencer on their air exhaust port. • Install less noisy movement/reversing warning systems for equipment and vehicles that will			construction period.

		operate for extended periods, during sensitive times or in close proximity to sensitive sites. Occupational health and safety requirements for use of warning systems must be followed. • Turn off plant when not being used. • All vehicular movements to and from the site to only occur during the scheduled normal working hours, unless approval has been granted by the Engineer. • Keep good conditions of trucks that use to transport construction materials so they cause no loud noise and control the truck speed, to be not exceeded 40 km/hr when driving through communities, and not exceeded 80 km/hr when driving on highways. • Where possible, no truck associated with the work should be left standing with its engine operating in a street adjacent to a residential area. • Provision of noise protection kits such as ear plug, earmuff, for workers who are working in the area with noise level is higher than 85 dB(A). It is designated as a regulation that workers must wear protection kits in case of working in a noisy area.			
\Vibration	Tunneling Vibration	The Contractor shall follow the procedures outlined in Section G.8.6 of the EIA.	Contractor and Engineer to implement mitigation.	N/A	N/A
	Piling Vibrations	Condition surveys of all properties within 50 meters of bridge piles.	Engineer	N/A	N/A
	Blasting	• No blasting will be carried out within 100 m of the portal of the tunnel. • Blasting will be scheduled during the day only. • Local communities will be informed of blasting timetable in advance and will be provided adequate notice of when blasts are required outside of the planned schedule.	Contractor and Engineer to implement mitigation.	Engineers NES	Routine inspections of blasting activities.

Subject	Potential Impact / Issue	Mitigation / Monitoring Measure	Responsibilities
Hydrology	Drainage issues	Monitor drainage along the road to ensure that it does result in increased run-off and flooding.	RD
	Groundwater depletion	If groundwater fails to re-charge to pre-construction levels alternative water supply will be provided to the affected parties.	Contractor during DFL period
Tree re-planting	Tree maintenance	If tree maintenance and habitat restoration extends beyond the construction and DFL period the RD shall engage an operator to continue maintenance of the trees / habitat area to complete the two-year maintenance period.	RD to contract a suitable operator.
Tunnels	Air quality	Ensure continued maintenance of tunnel ventilation system.	RD

Subject	Potential Impact / Issue	Mitigation / Monitoring Measure	Responsibilities
Fauna	Impacts to animals	• Register and analyze road kills. Develop additional mitigation measures if found to be necessary. • During maintenance works strictly comply with wildlife/vegetation impact mitigation measures set for construction stage. • Prohibit poaching (ensure that tunnel operator staff is aware of the ban).	RD
Road Maintenance	Pollution of water	• Perform maintenance paving of the road sections and bridge decks only in dry weather to prevent runoff contamination. • Use staging techniques 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. • Comply with mitigation measures defined for water protection during construction. • Remove all waste, material, machinery and tool from the area after completion of works. • Reinstate disturbed areas – if the case.	RD
Waste Management	Pollution of the environment	• Install waste collection bins in technical buildings area. • Use garbage bins fitted with lids to avoid scattering around and attraction of scavengers. • Segregate hazardous, non-hazardous and reusable waste streams. • Manage and dispose hazardous waste according to the type and the class of hazard. Note: for hazardous waste removal licensed company must be contracted. • Until removal (temporarily) waste must be stored within secure facilities with weatherproof flooring and roofing. • Dispose garbage according to agreement with licensed waste management contractors.	RD
Climate Change	GHGs	• Measure and report annual GHG emissions.	RD

Annex 2 - Baseline Measurements Guidelines

Construction Phase Instrumental Monitoring

Issue	Monitoring	Locations	Schedule	Responsibilities	Reporting
Air Quality	Establish routine ambient air quality monitoring throughout the construction period. Baseline monitoring shall be undertaken once ***before*** the start of the Construction work to provide robust data in addition to that provided in this report.	• KM 4.4 • KM 5.8 • KM 6.4 • KM 9.2 • KM 12.6	Monitoring to be undertaken monthly during construction period (30 months)	The Engineer shall hire certified laboratory to perform the monitoring activities.	The certified laboratory shall provide the results to the Engineer within three days of the monitoring activity.

Issue	Monitoring	Locations	Schedule	Responsibilities	Reporting
	The following parameters shall be monitored in line with IFC / EU averaging periods: Particulate Matter (PM_{10} & $PM_{2.5}$). Nitrogen Oxide (NO_X) Sulphur Dioxide (SO_2)	• KM 13.3			
Noise	Ensure that routine noise monitoring is undertaken throughout the construction period. Parameters to be monitored include: Laeq 1h (dBA)	• KM 4.4 • KM 5.8 • KM 6.4 • KM 9.2 • KM 12.6 • KM 13.3	Monitoring to be undertaken monthly both daytime and night-time measurements during construction period (30 months)	The Engineer shall hire certified laboratory to perform the monitoring activities.	The certified laboratory shall provide the results to the Engineer within three days of the monitoring activity.
Vibration	Vibration sensors for PPV monitoring.	At each tunnel location	Throughout tunnel blasting period.	Contractor to purchase, install and monitor vibration.	Weekly reporting of vibration results to the Engineer.
Surface Water Quality	Establish routine water quality monitoring throughout the construction period. The following parameters shall be monitored: pH; Suspended Solids; BOD5; COD; Coliforms; Nitrate (NO3); Phosphate (PO4); Oil and Grease	50 meters upstream from all bridge sites crossing rivers (3 locations) during construction; 50 meters downstream of the bridge site.	Monitoring to be undertaken monthly during bridge construction works	The Engineer shall hire certified laboratory to perform the monitoring activities.	The certified laboratory shall provide the results to the Engineer within seven days of the monitoring activity.
Tunnel water	Monitoring of water from tunnel dewatering settlement tanks. Parameters will include all required to meet Georgian drinking water standards.	At all settlement tanks.	Weekly	The Engineer shall hire certified laboratory to perform the monitoring activities.	The certified laboratory shall provide the results to the Engineer within 5 days of the monitoring activity.
Ground water	Monitoring of groundwater levels.	Selection of ten sites	Weekly	The Engineer shall perform the monitoring activities.	Weekly reporting by the Engineer to affected parties.
Pre-construction soils	Analysis of four additional soil samples taken close to the GAA. Parameters to be monitored: All parameters tested in **Section E,** Error! Reference source not found. **and** US EPA 16 PAHs.	Exact locations to be determined by the Engineer	Prior to the start of construction	The Engineer shall hire certified laboratory to perform the monitoring activities.	The certified laboratory shall provide the results to the Engineer within three days of the monitoring activity.

Issue	Monitoring	Locations	Schedule	Responsibilities	Reporting
Soils	If required, undertake a soil sampling program on the stockpiles of excavated material to the north of the GAA. Parameters to be monitored: All parameters tested in **Section E,** Error! Reference source not found. **and** US EPA 16 PAHs.	Contractor to divide the stockpiles into ten quadrants of mixed soil.	Monitoring to be completed before materials can be removed from the stockpile site.	The Engineer shall hire certified laboratory to perform the monitoring activities.	The certified laboratory shall provide the results to the Engineer within 20 days of the monitoring activity. The Engineer will immediately provide the results to the Contractor for disposal as hazardous or non-hazardous materials.

Operational Phase Instrumental Monitoring

Issue	Monitoring	Locations	Schedule	Responsibilities	Reporting
Air Quality	The following parameters shall be monitored in line with IFC / EU averaging periods: Particulate Matter (PM_{10} & $PM_{2.5}$). Nitrogen Oxide (NO_X) Sulphur Dioxide (SO_2)	Same as during the construction phase.	Bi-annually during DLP	Engineer (during defects liability period)	Bi-annual submission of results to ADB.
Noise	Noise monitoring - Laeq 24h (dBA) both daytime and nighttime periods.	At all receptors within Project corridor	Twice per year during DLP	Engineer (during defects liability period)	Annual submission of results to ADB for two years after the completion of the project.
Final noise barrier monitoring	Undertake noise monitoring at sensitive receptors behind finished noise barriers to ensure the barriers are functioning according to their design.	At all identified receptors.	Once, daytime and nighttime	Contractor	Provide final results to RD within one month of the completion of construction of any noise barrier.