#1 Semestral Report:Reporting period: July- December 2021January 2022

Batumi Bypass Road Project — Construction of Bakurtsikhe-Tsnori Road Section

(Financed by the Asian Development Bank)

Loan No GEO 3520-GEO

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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
ТВА	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 construction of Bakurtsikhe-Tsnori Road Section.

2. This report is the first Semi-Annual EMR for the project and covers the period of July-December 2021.

1.2 Headline Information

3. The Contract for Project Management Consultancy Services (PMCS) between RD and Joint Venture IRD Engineering S.R.L & GMC Consulting LLC Authorized Representative was signed on 19 October 2021 and the Contract for the Construction of Bakurtsikhe-Tsnori Road Section between RD and China Road and Bridge Corporation was signed on 29 November 2021. Awarded contracts included EMPs cleared by ADB and conditions of national EIA clearance. The Project design review and construction activities have not been commenced yet.

2 PROJECT DESCRIPTION AND CURRENT ACTIVITIES

2.1 **Project Description**

4. The Tbilisi-Bakurtsikhe-Lagodekhi international road (S-5) connects Tbilisi with Lagodekhi city and the State border with Azerbaijan, as well as with the cities of Kakheti. The Bakurtsikhe-Tsnori section is located along the Tsivgombori ridge and passes through densely populated villages in Gurjaani and Sighnaghi districts and several ravines. The deteriorating condition of the existing road and high levels of congestion, including from a large number of heavy goods vehicles (HGVs), has reduced road safety and limited the ability to accommodate future projected traffic. This is particularly problematic on the Bakurtsikhe-Vakiri section of the road where the existing alignment runs through the villages of Bakurtsikhe, Kardenakhi, Anaga, and Vakiri. The road does not currently meet the necessary international standards and there is no feasible option to improve the existing road without requiring demolition of infrastructure (houses, land plots, etc.) and resettlement.

5. The Bakurtsikhe-Tsnori road section is expected to be designed and built in the Alazani lowland along a new alignment bypassing the settled areas along the existing road. The new road section will branch from the Bakurtsikhe - Gurjaani bypass road, which is presently under construction, at approximately km 1.8. The road continues north-east crossing an irrigation canal and then turning right to run parallel to the canal in a south-easterly direction before connection with the S-5 Tbilisi - Lagodedekhi. The length of the new road is approximately 16 km, starting at km 0+600 and ending at km 16+809. The road is located within Gurjaani Municipality (Bakurtsikhe) and Sighnaghi Municipality (Tsnori).

6. To provide adequate access to the villages being bypassed, a diamond interchange at km 11+386 is planned. The secondary road where the new interchange will connect will be rehabilitated/paved. The length of the secondary road is approximately 1,100 m and the paved carriageway width will be 6 m with 0.50 m gravel shoulder on both sides. While final designs of the secondary road still need to be developed by the design-build Contractor, the upgraded road will stay within the exiting right-of-way

(ROW).¹ The secondary road currently connects the village of Vakiri to a service road running parallel to the agriculture channel and the proposed road. The secondary road is now being utilized by local residents and farmers and the numbers of vehicles is very low. Since the secondary road will be the only connection along the new road between Bakurtsikhe and Tsnori, the number of users is expected to increase however.

7. The Project area is sparsely populated and highly agricultural. The area is characterized by a large number of small-scale farms and land acquisition and resettlement was identified immediately as key issue of concern in defining alignment alternatives. There were particular concerns around land parcels not officially registered and with the anticipated impact on agriculture land being for production of fruit and grapes in the planned ROW. The map of the project road is given in the **Figure 1** below.





8. The project is classified as category A for the environment under ADB's Safeguard Policy Statement (2009). Project implementation period is: 2021-2025.

The Roads Department of Georgia under the Ministry of Regional Development and Infrastructure of Georgia submitted the IEE to the Minister of the Environmental Protection

¹ Davit Getsadze, Roads Department, pers. comm. 2019

and Agriculture of Georgia on 06.09.2019 for approval.

9. Based on submitted documentation Environmental Decision dated 06.11.2019 (order N2-1050) was issued by the Ministry of the Environmental Protection and Agriculture of Georgia.

2.2 Project Contracts and Management

10. Following the IEE and the PAM requirements the Project Management Consultancy Services Company and Construction Contractor have already mobilized national and international EHS specialists (names and contact details are provided in **Table 1**).

11. The TOR for the Project Management Consultancy Services 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 postconstruction environmental audit report with filled environmental audit checklist.

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

12. Contact details of ADB (Asian Development Bank), SC (Supervision Consultant), CC (Construction Contractor), and RD (Road Department) representatives are given in **Table 1** below.

Organization	Position	Name	Nationality
ADB	Head Office,	Name: Ninette Pajarillaga	
	Environmental	Cell:	
	Specialist, Portfolio,	E-mail: npajarillaga@adb.org_	
	Results, Safeguards		
	and Gender Unit		
	(PSG), CWRD		
	ADB/RETA	Name: Keti Dgebuadze	Georgian
	International	Cell: +995577232937	
	Environmental	E-mail:	
	Safeguards	kdgebuuadze.consultant@adb.org;	
	Consultant	ketdgeb@adb.org	

	Associate	Name: Nino Nadashvili	Georgian
	Safeguards Officer	Cell: +995 595 070442	
	Georgia Resident	e-mail: nnadashvili@adb.org	
	Mission		
RD	Environmental	Name: Luiza Bubashvili	Georgian
	Specialist	Cell: +9995219141	
		e-mail: likabubashvili@yahoo.com	
	Head of	Name: Gia Sopadze	Georgian
	Environmental Unit	Cell: +10599939209	
		e-mail: sopgia@gmail.com	
SC	International		
	Environmental	Biljana Manevska, Mobile:	
	Specialist	+389 75 328 338	
	Environmental Expert	Name: Nino Jangulashvili	Georgian
		Cell: +995592030578	
		e-mail: ninka72@gmail.com	
CC	Project Manager	Name: Margo Gabelaia,	Georgian
		Cell: +995598210767	
	Environmental	Name: Mirian Nozadze	Georgian
	Specialist	Cell: +995571079276	

2.3 Project Activities During Current Reporting Period

13. construction activities have not been commenced yet.

2.4 Description of Any Changes to Project Design

14. N/A

2.5 Description of Any Changes to Agreed Construction methods

15. 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. 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

17. N/A

3.3 Issues Tracking (Based on Non-Conformance Notices)

18. N/A

3.4 Trends

19. N/A

3.5 Unanticipated Environmental Impacts or Risks

20. N/A

4. RESULTS OF ENVIRONMENTAL MONITORING

4.1 Overview of Monitoring Conducted During Current Period

21. 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. According to the project EIA, periodic parametric mesurements of air, noise and water quality will be carried out by the construction 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

22. N/A

4.3 Summary of Monitoring Outcomes

23. N/A

4.4 Material Resources Utilisation

24. N/A

4.4.1 Current Period

25. N/A

4.5 Waste Management

26. N/A

4.5.1 Current Period

27. N/A

4.6 Health and Safety

4.6.1 Community Health and Safety

28. N/A

4.6.2 Worker Safety and Health

29. N/A

4.6.3 Training

30. N/A

5. FUNCTIONING OF THE SEMP

5.1 SEMP Review

31. Site Specific and Topic Specific EMPs will be prepared by the Contractor 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

32. Not yet applicable.

6.2 Opportunities for Improvement

33. Not yet applicable.

7. SUMMARY AND RECOMMENDATIONS

7.1 Summary

34. Not yet applicable.

7.2 Recommendations

35. 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 – Q1 2022.
- 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 April 2022.
- Construction Contractor to conduct baseline measurements of water, air and noise on regular bases before commencement of Construction activities April 2022
- Carry out pre-construction survey of buildings and structures within 50 m distance from the highway April 2022
- Conduct parametric measurements for air, water, noise and vibration during next reporting period April 2022

ANNEXES:

Annex 1 – Environmental Management Plan

Environmental Management Plan for Pre-construction Phase

Affected	Potential Impact / Issue		Estimated	Responsibility	
Aspect		Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control
Pre-Constructio	n Stage				
EMP contractual obligations	Implementation of Project EMP and Specific Environmental Management Plan (SEMP)	 Prior to commencement of civil works, the Contractor shall prepare a Specific EMP (SEMP) for Engineer endorsement and RD approval. The SEMP shall also be reviewed by ADB. The SEMP will present detailed implementation plan based on the Contractor's actual construction methodologies, work schedule, type/specifications, and number of construction plants to be used The SEMP shall be (a) consistent with the SEMP template included in the IEE (see Error! Reference source not found.); (b) consistent with the project EMP; and (c) prepared based on the Contractor's activities and corresponding locations. The SEMP will provide the following: Contractor's organizational structure showing the implementation, supervision and reporting and responsibilities of key personnel The Project program and work activities The Contractor's topic and site-specific plans as follows: Waste Management Plan Spoil Disposal Management Plan Traffic Management Plan Method Statement for Temporary Roads 	Contractor Cost	Contractor to Implement Mitigation	Engineer, RD, ADB

Affected Aspect	Potential Impact / Issue	Mitigation/Enhancement Measures (all that apply)	Estimated Cost	Responsibility	
				Development/ Implementation	Control
		 Aggregate and Borrow Pits Management Plan Employment and Procurement Procedure Occupational and Community Health and Safety Management Plan Emergency Response Plan Air Quality Plan Spill Management Plan Clearance, Revegetation, and Restoration Management Plan Clearance, Revegetation, and Restoration Management Plan Noise Management Plan Biodiversity Management Plan Laydown Area and Construction Camp Management Plan Asphalt, Rock Crushing, and Concrete Batching Plant Management Plans Bridge Construction Plan Construction Vibration Management Plan The Occupational and Community Health and Safety Management Plan shill be consistent with the template provided in the IEE (see Error! Reference source not found.). The Soil Disposal Management Plan shall utilize the assessment template include in the IEE (see Error! Reference source not found.). The Contractor will develop and implement an ACW Management plan in collaboration with the RD if asbestos-containing waste is identified in the ROW or in buildings to be demolished (see Error! Reference source not found.). The Contractor will retain the expertise of a qualified Environment and Social Officer (ESO) and Community Liaison Officer (CLO). The Contractor will obtain all necessary permits and approvals before commencing construction activities. 			

Affected	Potential		Estimated Cost	Responsibility	
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)		Development/ Implementation	Control
Training	Contractors training and awareness raising programs	 All personnel shall be required to undergo a project site induction that includes the environmental requirements of the Project. 	Contractor Cost	Contractor to Implement Mitigation	RD, ADB
Climate Change	Future climate changes may cause damage to the bridge and approach roads	• Further climate change studies must be carried out as necessary to ensure that climate change considerations have been incorporated in the design of the bridge and approach roads.	Project Cost	Contractor to Implement Mitigation	RD
Noise/Vibration	Vibration emissions resulting from the use of machinery and equipment and vehicle circulation	 The status of the buildings nearest to the project site will be surveyed. The surveys will cover the following aspects: Overall condition of the structures, both exterior and interior. Documentation of defects and preexisting cracks observed in the structure using digital imagery along with notes, measurements, and sketches. The findings of the survey shall be agreed upon by the property owner who shall be in attendance during the survey and will sign official documentation agreeing to the findings of the survey. Conduct additional pre-construction noise survey to confirm site conditions. Incorporate findings of such investigations in the updated IEE and EMP if necessary. Prepare noise and vibration modelling for the Vakiri Village access road to determine whether mitigation measures need to be developed and implemented to address noise levels during the operation phase. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
Flora and Fauna Habitat, Distribution, and Species	Rehabilitation of the secondary road leading from the proposed	• Ensure that the rehabilitation of the secondary road leading to Vakiri village stays within the exiting ROW.	Project Cost	Contractor to Implement Mitigation	RD

Affected	Potential	Mitigation/Enhancement Measures (all that apply)	Estimated Cost	Responsibility	
Aspect	/ Issue			Development/ Implementation	Control
	diamond interchange to Vakiri village.				
	Cumulative impacts from the multiple development in the region.	• Consultation will be taken with IFI's, donors, and implementing units on other projects that are likely to contribute to cumulative impacts so as to reduce uncertainty and, where necessary, take appropriate action to minimize environmental harm.	Project Cost	RD	N/A
Flora / Habitats	Mortality of individuals / Loss of habitat	 The Contractor shall conduct a survey prior to construction to identify and quantify habitat types to ensure that impacts can be correctly quantified, and any replanting requirements can be properly established. The Contractor shall identify through a site survey the Georgian Red-listed tree species located within five meters of the site boundary. This survey will form part of the Contractor's Clearance, Revegetation, and Restoration Management Plan. Where walkover surveys pre-construction reveals protected plant species in the area, the latter will be removed from the environment and translocated in accordance with sub-paragraph (v), Article 24, first paragraph of the law of Georgia on 'Red List and Red Book'. Relocation of any specimens found during the surveys where practical will be provided with the help of biodiversity experts to ensure proper handling. This is especially important for species of conservation. The practice will provide the best possible chance of survival for wildlife. A plan and schedule must be developed by the Contractor prior to implementation of this task. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
Change of Land Use and Livelihoods	Land acquisition and livelihood loss to affected	• Before the commencement of the construction works of the Project, the RD must finalize and implement the Land Acquisition and Resettlement Plan (the LARP) designed in compliance with the ADB Safeguards Policy Statement 2009.	LARP Cost / Project Cost	RD to finalize the LARP and implement the	ADB to approve the LARP

Affected	Potential		Estimated Cost	Responsibility	
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)		Development/ Implementation	Control
	persons			Plan.	
	Barrier effect (impacts on mobility and access of locals to areas such as farmlands, aquaculture ponds, etc., across the Project road)	• Ensure designs retain habitat along the edge of the irrigation canal opposite of the planned highway to reduce impact on species, retain connectivity, and offer free movement.	Project Cost	Contractor to Implement Mitigation	RD
Services Demand	The disruption of services, including energy, to surrounding communities due to relocation of utilities.	 All telephone and electrical poles/wires and underground cables should be shifted before start of construction. Necessary permission and payments should be made to relevant utility service agencies to allow quick shifting and restoration of utility services. Local people must be informed through appropriate means about the time of shifting of utility structures and potential disruption of services if any. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
Grievance Redress	Complaints due to project implementation	 Prior to commencement of site works, the contractor will develop a grievance redress mechanism (GRM) or system that will allow for receiving/recording and immediate response to and resolution of construction-related complaints. The GRM shall be consistent with the GRM described in this IEE. The Contractor will inform the communities along the alignment and other stakeholders affected by the Project about the GRM in place to handle complaints and concerns about the Project. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer

Affected Aspect	Potential Impact / Issue	Mitigation/Enhancement Measures (all that apply)	Estimated Cost	Respo Development/ Implementation	nsibility Control
		 The Contractor will also install notice boards at the construction sites to publicize the name and telephone numbers of the representatives of the Contractor, and the RD. 			

Environmental Management Plan - for Site Preparation, Construction, and Worksite Closure Phases

Affected	Potential	ential pact Mitigation/Enhancement Measures (all that apply) ssue	Estimated	Responsibility	
Aspect	/ Issue		Cost	Development/ Implementation	Control
Site Preparation	, Construction an	d Worksite Closure (i.e., project closure) Phase		1	
Air Quality	Localized emissions of dust resulting from the use of machinery and equipment and circulation of vehicles.	 Dust generating areas will be controlled by water spraying, particularly under dry weather conditions. Stockpiles will be planned and sited to minimize the potential for dust generation by taking into account prevailing wind directions and the locations of sensitive receptors. The drop height of potentially dust generating materials will be kept as low as possible. Where practicable, stockpiles will be located away from sensitive receptors. If crushing of construction materials is required, crushers will be located away from sensitive receptors. If crushing of construction materials is required, crushers will be located away from sensitive receptors. Keeping at least 300 m distance from residences windward to concrete production plants should be ensured. An environmental impact permit for an asphalt plant (if planned to run own facility) will be obtained before operation. On-site speed limits will be applied and enforced for trucks travelling on unpaved surfaces (20 km/h). Trucks transporting spoil or other dusty materials off-site will be covered before leaving the sites. Wheel washing facilities will be available and used so that trucks leaving the site do not spread dust onto neighboring roads. Public roads used by site traffic will be swept regularly to prevent accumulation of dirt. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
	Localized and long-term emissions of combustion gas resulting from the use of machinery and	 Machines and construction plant items (e.g., trucks) that may be in intermittent use will be shut down or throttled down between work periods. The burning of waste or vegetation on site is prohibited. Special attention will be given in storage and handling of petrochemicals in order to avoid environmental hazards and risks. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer

Affected	Potential Impact / Issue	otential	Estimated	Responsibility	
Aspect		Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control
	equipment and circulation of vehicles.	 Maintenance procedures will be implemented in order to keep equipment in good working condition to minimize exhaust emissions caused by poor performance. Training will be provided for the operators of equipment and truck drivers regarding the air pollution potential of their activities. 			
	Effects of road vehicle emissions on neighboring vineyards	 The following procedure for monitoring and mitigation of impacts on adjacent vineyards will be undertake <u>prior</u> to the operation phase: Before the new road opens, measure baseline levels of nitrogen dioxide and dust deposition at illustrative locations. Review the findings and update the baseline assessment of air quality impacts on vineyards presented in Section Error! Reference source not found Identify whether mitigation may potentially be required in light of improved data on baseline air quality. 			
Noise	Noise and vibration emissions resulting from the use of machinery and equipment and vehicle circulation	 Work hours will be restricted between 07:00 to 20:00 hours within 500 m of the settlements. Optimum travel speed during offsite travel will be established by the Contractor. Install temporary noise barriers made of plywood or acoustical blankets around noisy operation where necessary to comply with project noise limits. Use newer equipment with improved noise muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.). The number of equipment operating simultaneously will be reduced as far as practicable. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer

Affected	Potential	tial ct Mitigation/Enhancement Measures (all that apply) le	Ectimated	Responsibility	
Aspect	Impact / Issue		Cost	Development/ Implementation	Control
		 Orientate equipment known to emit noise strongly in one direction so that the noise is directed away from receptors as far as practicable. Locate noisy plants as far away from receptors as practicable. Avoid transportation of materials on- and off-site through existing community areas during nighttime hours. Use material stockpiles and other structures, where practicable, to screen noise sensitive receptors from onsite construction activities. Record and respond to complaints according to the established grievance redress mechanism. Keep nearby residences informed in advance about noisy activities during various construction phases. Perform independent periodic noise and vibration monitoring (see Section Error! Reference source not found.) to demonstrate compliance with Project noise and vibration limits. When there is a possibility of human annoyance from construction activities, conduct such activity only during weekday daytime hours when the ambient background noise and vibration is higher and many residents are away from their homes at work. Use drill and cast in place columns (CIDH) method for bridge columns instead of impact pilling near noise sensitive areas if it is practical. Reduce force of the vibratory roller on the portion of the secondary road where there are houses along the road to avoid vibration impacts. 			
Soil Quality	Land pollution due to wrong management of solid waste, as well as possible dripping of hydrocarbons	• Temporary fuel tanks will be located at least 50 m away from any watercourse, drain, or channel leading to a water course. The tank will be placed in covered areas with berms or dikes installed to intercept spills, if any. Any spill will be immediately localized and cleaned up with absorbent materials. The bund will be able to accommodate 110% of the volume of the tank.	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer

Affected	Potential	Potential	Estimated	Responsibility	
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control
	from machinery and equipment, and wrong storage of oil and fuel.	 Onsite repairs /maintenance and fueling activities will be limited to the extent possible. On-site vehicles and equipment shall be inspected regularly for leaks and all leaks shall be immediately repaired. Leaking vehicles/equipment will not be allowed on-site. Secondary containment devices (drop cloths, drain pans) shall be used to catch leaks or spills while removing or changing oils from vehicles or equipment. For small spills, absorbent materials will be used. Tire washing units will be equipped with drainage settling facilities. The washout pit will be cleaned immediately upon 75% filling. No washing of vehicles etc. in the river will be allowed. Usage of off-site vehicle wash racks or commercial washing facilities will be used whenever feasible. Bermed wash areas for cleaning activities will be established if onsite cleaning is required. Contractor will implement a training program to familiarize staff with emergency procedures and practices related to contamination events. Operating personnel will be trained to visually inspect discharged water quality for oil and grease traces (that will be visible on the surface) periodically and take appropriate corrective actions. 			
Soil Structure	Land erosion due to loss of vegetation coverage and changes in its structure	 Materials and waste will be stockpiled so as to avoid erosion and washing off into the river. Drainage trenches will be established to divert surface runoff from the site. To avoid loss of the productive soil layer, all suitable topsoil and other material shall be saved and stockpiled separately for the future recultivation of the area. Stockpiles of removed topsoil will be properly designed/shaped and managed. Temporary detention ponds or containment to control silt runoff will be provided. Construct intercepting ditches and drains to prevent runoff entering construction sites 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer

Affected	Potential Impact		Estimated	Responsibility	
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control
Relief	Modification of geological formations - Quarries	 Soil compaction may be reduced by strictly keeping to temporary road boundaries Slopes of embankment will be protected from erosion by vegetation and slope drainage. The design considers selection of a reasonable embankment height, establishment of temporary berms, slope drains, temporary pipes, contour ditches, ditch checks, diversions, and sediment traps Disturbed vegetation must be replanted immediately after the construction/disturbance stops Appropriately set up temporary construction camps (if determined needed) and storage areas to minimize the land area required and impact on soil erosion. The Contractor will carry out operation of quarries and borrow pits, as well as extraction of gravel from river terraces (if utilized), in strict accordance with the conditions of a license issued by the Ministry of Economic Development (MoED) and cleared by the Ministry of Environment Protection and Agriculture (MoEPA); and The Contractor will be responsible to develop, agree and 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
		 strictly adhere to quarry/borrow pit operation and re- cultivation plan (if the Contractor owns or establishes a new quarry site). Borrow areas for materials, other than dredged sand fill, shall not be located in productive land, forested areas and near water courses such as rivers, streams, etc. 			
Water Quality	Surface water contamination from accidentally spilled fuel/oil and road surface runoff	• The RD will ensure that maintenance of all water drainage structures is included in the Road Maintenance Contractor's SOW, in addition to being financed and monitored accordingly.	Project Cost	RD	N/A

Affected	Potential	ial Mitigation/Enhancement Measures (all that apply) e	Estimated Cost	Responsibility	
Aspect	/ Issue			Development/ Implementation	Control
	Pollution of nearby water bodies due to poor storage and management of construction materials	 Discharge of any untreated water into surface water bodies will be strictly prohibited. Discharges into the irrigation canal will be prohibited. Discharge of cement contaminated water will be prohibited as cement pollution results in high alkalinity and raises the pH, which can be toxic to aquatic life. To prevent runoff contamination, paving will be performed only in dry weather. In disturbed soil areas, compacted straw (straw bales), silt fence, fibber rolls, gravel bags, or other approved sediment control must be ensured. At a minimum, all bare soil (whether it's an abutment slope or a stockpile) must be protected before it rains. Drainage systems and erosion control and silt removal facilities will be regularly inspected and maintained to ensure proper and efficient operation at all times. Vegetation will be preserved where feasible, in particular in the areas near river banks to avoid erosion/sedimentation. Areas will be promptly revegetated, where practicable and appropriate. The construction camp (if needed), permanent or temporary, will not be located within 500 m of any river, or irrigation channel. Wastewater Management Plan (see Section Error! Reference source not found.) and proper sewage collection and disposal system will be available to prevent pollution of watercourses (if discharge in surface water is planned). Storm water drainage and wastewater will be treated in accordance to the applicable World Bank/IFC guidelines. The Contractor will take all necessary measures to ensure effluent and runoff is not discharge in surface water deviced be irrigation channel. 	Contractor	Contractor to Implement Mitigation	RD, Engineer
	surface water contamination	to minimize the potential damage or contamination of the materials.	Cost	Implement	

Affected	Potential Impact	tial Ct Mittaction (Enhancement Maccures (all that annual)	Estimated	Responsibility	
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control
	from inappropriate waste management	 A construction materials inventory management system will be implemented to minimize over-supply of the construction materials, which may lead to disposal of the surplus materials at the end of the construction period. Hazardous and non-hazardous waste will be segregated and appropriate containers for the type of waste type will be provided. Waste will be stored systematically to allow inspection between containers to monitor leaks or spills. Waste will be disposed of systematically by licensed contractors. Storm water drainage and wastewater will be treated in accordance to the applicable World Bank/IFC guidelines. 		Mitigation	Engineer
	Impacts to surface water due to contamination from accidental releases of hazardous substances	 Implementation of the specific mitigation measures outlined under Contamination of Soils above. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
	Water pollution from bridge/ pipe / culvert construction	 Silt fences, sediment barriers, or other devices to prevent migration of silt during construction within the river will be provided. Ensure no waste materials are dumped in the river, including re-enforced concrete debris. Generators will be placed more than 20 m from rivers/canals/channels. No concrete waste from concrete mixers will be dumped in to water bodies. Areas where concrete mixers can wash out leftover concrete without polluting the environment will be provided. This may be in the form of a lined settling pond. Drivers will be informed of these locations and the 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer

Affected	Potential Impact	Potential Impact	Estimated	Responsibility	
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control
Vegetative	Loss of	 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. (as long as not contaminated). Delimitation of areas to be cleared will be made before 	Contractor	Contractor to	RD,
Coverage	vegetation coverage in specific areas of the project	 Definitiation of areas to be cleared will be made before the beginning of the construction activities in order to limit as much as possible the surface of vegetation to be cleared. Boundaries of ROW and operation area will be strictly kept to - to avoid impact on the adjacent vegetation; Strict keeping to traffic routes during the construction will be ensured to avoid impact on vegetation. The planned clearance area for the construction works shall be clearly identified and marked to avoid accidental clearing. Fencing of critical root zones of the trees at the boundary with the project area or on the way will be carried out. Project will utilize or upgrade existing roads where possible to minimize unnecessary clearing requirements. Training of the staff in environmental and safety issues, including protection of vegetation outside the boundaries of the Project corridor. Care will be taken to avoid introduction of new invasive species to, and spread of existing invasive species within, the Project area through: washing of vehicles, equipment and supplies before entry to the Project area; monitoring for invasive species; and control/eradication of invasive species where found. Implement Clearance, Revegetation, and Restoration Management. Description of fine dust and aerosol will be limited to the narrowest area possible through protective revegetation activities on both sides of the road. 	Cost	Implement Mitigation	Engineer
Vegetative Coverage	Planting of vegetation on	• Disturbed sites will be recultivated after completion of works.	Contractor Cost	Contractor to	Supervision Contractor to

Affected	Potential Impact	ntial	Estimated	Responsibility	
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control
Terrestrial Habitat	rehabilitating disturbed areas	 The Clearance, Revegetation, and Restoration Management Plan (see Section Error! Reference source not found.) prepared prior to construction will be followed. No net loss of natural habitat will be ensured based on the site survey conducted during Pre-Construction Stage. 		Mitigation	Success Rate (RD to determine success rate criteria)
	Tree cutting	 Plant maintenance will be carried out for at least two years. The Contractor shall be responsible for replanting of any trees cut in these areas on a 1:3 basis using species native to the area. 	Contractor Cost	Contractor and RD to Implement Mitigation	RD, Engineer
	Modification, fragmentation, and degradation of habitat	 Air, water, soil, and noise impact mitigation measures will be implemented. Waste management – regular clean-up of the areas, management of waste according to the type and category. Refueling of all plant, vehicles, and machinery will not be allowed within 50 m of any watercourse, drain or channel leading to a water course. Construction materials and chemicals will be appropriately secured during flood season to avoid accidental release to the natural environment. Oil, chemical and solid waste will be stored, and handled and disposed of by appropriately licensed waste management contractors. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
Terrestrial Habitat	Introduction of invasive alien species	• Care will be taken to avoid introduction of new invasive species to, and spread of existing invasive species within, the Project area through: washing of vehicles, equipment and supplies before entry to the Project area; monitoring for invasive species; and control/eradication of invasive species where found.	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
	Fauna mortality	• Speed limits to maximum of 20 km/hr for construction vehicles will be enforced to minimize potential for fauna strike.	Contractor Cost	Contractor to Implement	RD, Engineer

Affected Aspect	Potential Impact	tial ct Mitigation/Enhancement Measures (all that apply) ue	Estimated	Responsibility	
	/ Issue		Cost	Development/ Implementation	Control
		 Commitment will be made to raise awareness of values of natural habitat areas to construction work force and arrangements will be made for restriction of poaching and forest product collection. Hunting wild animals will be strictly prohibited to apply for all staff. 		Mitigation	
Terrestrial Fauna Distribution	Displacement of species due to noise, presence of machinery and equipment and presence of staff.	 Adherence to no horn policy will be enforced. All vehicles, equipment and machinery used for construction will be regularly maintained and inspected/certificated to ensure that the noise levels conform to the standards prescribed. If lights are installed on the road or bridges, ensure that lower wattage lamps are used in street-lights which direct light downwards to reduce glare. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
Landscape Quality	Cumulative impacts from the multiple development in the region.	• Consultation will be taken with IFI's, donors, and implementing units on other projects that are likely to contribute to cumulative impacts so as to reduce uncertainty and, where necessary, take appropriate action to minimize environmental harm.	Project Cost	Contractor to Implement Mitigation	RD, Engineer
	Change to existing landscape and character	 Implementation of mitigation measures defined for soil, vegetation, and waste management. Visual impact of construction works will be mitigated by keeping to the boundaries of the worksites and traffic routes; preservation of vegetation; cleanup and good management of construction sites and camps; timely removal of waste from the area; material stock control (to avoid accumulation of surplus material on the site) An approved recultivation plan will be implemented. After completion of works, the worksite will be cleaned up; surplus materials, temporary structures, and machinery will be removed. Site compounds within the landform will be carefully placed. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer

Affected	Potential		Fstimated	Responsibility	
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control
		 Existing woodland, land features, and other key elements will be retained and protected where possible within the proposed development corridor. Commitment to high quality design, materials, and specification for the road. 			
Change of Land Use and Livelihoods	Land acquisition and livelihood loss to affected persons	 Impacts of physical and economic displacement will be addressed through the resettlement plans that have been designed in compliance with the ADB Safeguards Policy Statement 2009. Written agreements with local landowners for temporary use of the property will be required and sites must be restored to level acceptable to the owner within a predetermined time period. 	Project Cost	RD to Implement the Plan / Corrective Action Plan	ADB to Approve the LARP / Corrective Action Plan
Jobs	Impacts on employment and economy	 An Employment and Procurement Procedure (see Section Error! Reference source not found.) should be established. Development of the plan should involve consultation with relevant stakeholders, including government authorities and local villagers. Opportunities to establish a skills training program with an aim of training interested local villagers to contribute to the Project should be reviewed. Local villagers should be informed of job opportunities in a timely manner. Local businesses should be informed of contracting opportunities in a timely manner. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
Services Demand	Impacts on community infrastructure and services	 Traffic advisory signs (to minimize traffic build-up) will be posted in coordination with local authorities. Accidentally damaged private property and/or infrastructure should be promptly restored. The community will be kept informed about the schedule of works which could cause temporary restriction of services and the potential duration of the 'impact' in advance. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer
Community Health and	Impacts on social cohesion	Construction camps (if established) will be located away from communities in order to avoid social conflict in	Contractor Cost	Contractor to	RD,

Affected	Potential Impact		Estimated	Responsibility		
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control	
Safety		 competition for resources and basic amenities such as water supply. Local residents should be given priority in hiring of construction workers. Employment of women will be encouraged. Goods and services will be sourced from local commercial enterprises to the extent possible. 		Mitigation	Engineer	
	Risks to community health and safety due to increased traffic; the transport, storage, and use and/or disposal of materials (e.g., fuel and chemicals); and access to structural elements or components of the project by members of the community.	 Air, water, soil, waste, and noise impact mitigation measures will be implemented. The Contractor shall provide appropriate safety barriers with hazard warning signs attached around all exposed openings and excavations. Noise, vibration, and emission impact mitigation measures will be implemented. Signs advising road users that construction is in progress will be provided, specifically at the points where the new road connects with the S-5. Flag persons will be employed to control traffic when construction equipment is entering or leaving the work area. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer	
Occupational Health and Safety	The exposure of workers to various physical hazards that may result to minor, disabling, catastrophic, or fatal injuries.	 Measures will be implemented to reduce the likelihood and consequence of the potential hazards. This shall include (but not limited to) the following hazards: Falling from height; Falling into water; Entanglement with machinery; Tripping over permanent obstacles or temporary obstructions; Slipping on greasy walkways; Falling objects; 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer	

• • • •	Potential			Responsibility		
Aspect	Impact / Issue	Mitigation/Enhancement Measures (all that apply)	Estimated Cost	Development/ Implementation	Control	
		 Contact with dangerous substances; Electric shock; Variable weather conditions; Lifting excessive weights; and Traffic operations. Competent and adequately resourced Subcontractors will be used where construction activities are to be subcontracted. All persons working on site will be provided information about risks on Site and arrangements will be made for workers to discuss health and safety with the Contractor. The Contractor will prepare and implement an Occupational and Community Health and Safety Management Plan (see Error! Reference source not found.) prior to commencing work. This plan will include provisions on clean water, sewage and wastewater, solid waste, liquid chemical waste, personal protection, emergency preparedness and response, records management, safety communication, and training and awareness. All workers will be properly informed, consulted and trained on health and safety issues. Personal Protective Equipment (PPE) shall be worn at all times on the Site. This shall include appropriate safety shoes, safety eyewear, and hard hats. Non-slip or studded boots will be worn to minimize the risk of slips. Before starting work all the appropriate safety equipment and the first-aid kits will be assembled and checked as being in working order. All scaffolding will be erected and inspected, and the appropriate records maintained by the Contractor. 				
		• When there is a risk of drowning, lifebelts shall be provided and it shall be ensured that personnel wear adequate buoyancy equipment or harness and safety				

Affected	Potential Impact		Estimated	Responsibility nated		
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control	
		 lines, and that rescue personnel are present when work is proceeding. All safety harnesses, life-lines, reviving apparatus and any other equipment provided for use in, or in connection with emergencies will be properly maintained and thoroughly examined at least once a month, and after every occasion on which it has been used. 				
Cultural Heritage	Risks to built heritage, objects, and sites that have archaeological, historical, religious, or other cultural value and significance.	The chance find procedure (see Error! Reference source not found.) for managing cultural heritage will be implemented if any cultural heritage is discovered during construction.	Contractor Cost	Contractor and RD to implement mitigation	RD, Engineer	
Grievance Redress	Complaints due to project implementation	 The Contractor will be responsible for nomination of Community Liaison Officer (CLO) and implementation of grievance procedure. Continuous monitoring and review of complaints received from neighboring communities around the Project activity areas as per the grievance redress mechanism. 	Contractor Cost	Contractor and RD to implement mitigation	RD, Engineer	
Waste	Pollution of land, water, or air from poor waste Management	 The Contractor will classify waste streams (hazardous, non-hazardous, or a waste that requires a full assessment to determine classification – so-called 'mirror entry' waste) and manage them according to international best practice and Georgian law. The Contractor will conclude an agreement with a municipality and solid non-hazardous and inert waste will be removed to a GoG licensed waste dump. Hazardous wastes will be handed over to licensed companies authorized for utilization of this types of the waste. 	Contractor Cost	Contractor to Implement Mitigation	RD, Engineer	

Affected Aspect	Potential Impact / Issue	Mitigation/Enhancement Measures (all that apply)	Estimated Cost	Respon Development/ Implementation	sibility Control
		• Ensure implementation of ACW Management plan (see Error! Reference source not found.) if asbestos- containing waste is identified in the boundaries of the Project corridor.			

Environmental Management Plan – Operational Phase

Affected	Potential Impact		Estimated	Responsibility		
Aspect / Issue		Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control	
Operation Stage	9					
Air Quality	Localized emissions of combustion gas and dust resulting from the circulation of vehicles.	 Local communities should be motivated to maintain greenery in the project area, including protective revegetation on both sides of the road. Regular maintenance of the road will be done to ensure good surface condition. 	Included in Operation / Maintenance cost	Local Communities / Road Maintenance Contractor	RD	
	Effects of road vehicle emissions on neighboring vineyards	 The following procedure for monitoring and mitigation of impacts on adjacent vineyards will be undertaken during the operation phase: Once the new road is operational, measure baseline levels of nitrogen dioxide and dust deposition at the same locations measured during the Site Preparation, Construction and Worksite Closure Phase (see above). Review the findings to confirm whether mitigation is required. If monitoring data shows that mitigation is found to be advisable based on the testing results, the following mitigation measures (targeted to the areas of concern) will be implemented as appropriate: Planting of vegetation barriers at the closest boundary of the vineyards to the road Use of solid fencing as part of the elevated road construction, adjacent to the proposed road Systematic sweeping and watering of roads Ongoing monitoring to confirm effectiveness 	Included in Operation / Maintenance cost	Local Communities / Road Maintenance Contractor	RD, ADB	

Affected	Potential		Estimated	Responsibility		
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control	
Soil Quality	Pollution due to littering	 Awareness raising and education of community on waste management (no illegal dumping or littering) should be provided. Regular maintenance and cleanup of the drainage system will be carried out to prevent impact on soil erosion or flooding. 	Included in Operation / Maintenance cost	Local Communities / Road Maintenance Contractor	RD	
Water Quality	Surface water contamination from accidentally spilled fuel/oil and road surface runoff.	 Implementation of mitigation measures set for pre- construction and construction stages of the project during the road maintenance works as appropriate. Maintenance paving of the road sections and bridge decks will be performed only in dry weather to prevent runoff contamination. Staging techniques will be used to reduce the spread of paving materials during the repair of potholes and worn pavement. These can include covering storm drain inlets and manholes during paving operations, using erosion and sediment controls to decrease runoff from repair sites, and using drip pans, absorbent materials, and other pollution prevention materials to limit leaks of paving materials and fluids from paving machines. Roadside strips and drainage structures will be regularly maintained and cleaned. 	Included in Operation / Maintenance cost	Road Maintenance Contractor / RD	RD	
Terrestrial and Aquatic Fauna Habitat	Degradation of habitat	 The presence of invasive species will be monitored. Roadside waste collection and clean up (sweeping) of the road will be done regularly. 	Included in Operation / Maintenance cost	Road Maintenance Contractor	RD	
Landscape Quality	Modification of the original landscape from the presence of new infrastructure	 Roadside vegetation will be preserved/maintained to shield the visual change in the landscape related to the new infrastructure (in addition to providing other benefits). Periodic inspections will be done to detect signs of slope instability and ensure revegetation where necessary. 	Included in Operation / Maintenance cost	Road Maintenance Contractor	RD	

Affected	Potential Impact		Estimated	Responsibility stimated		
Aspect	/ Issue	Mitigation/Enhancement Measures (all that apply)	Cost	Development/ Implementation	Control	
Occupational Health and Safety	The exposure of workers to various physical hazards that may result to minor, disabling, catastrophic, or fatal injuries.	 Applicable occupational health and safety measures taken during the construction phase will continue to be followed. 	Included in Operation / Maintenance cost	Road Maintenance Contractor	RD	
Community Health and Safety	Road accidents resulting from higher travel speeds and increased traffic	 Road safety facilities have been incorporated in the Project design at both preparatory and detailed design phases. These include traffic separation medians, pedestrian sidewalks, and signs and pavement markings complying with international and Georgian standards. These will be put in place by the Contractors during construction and will be maintained by the Project owner during the Project's service life. Monitoring and maintenance of road safety furniture will be done to sustain road safety facilities constructed under the project. 	Included in Operation / Maintenance cost	Road Maintenance Contractor / RD / Local Government and traffic authorities	RD	

Annex 2 - Environmental Monitoring Plan

Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How Is the parameter to be monitored?	When is the parameter to be monitored? (Frequency)	Institutional responsibility
Site Preparation,	Construction, and Worksite Clos	sure (i.e., project clos	ure) Phases		
EMP contractual obligations	• Development of thematic management plans (specific guidance and direction included in Error! Reference source not found. of the IEE).	• N/A	The RD will clear the plans.	 Thematic management pans should be cleared once before construction begins Information from the plans should be included in regular reports to the RD and ADB 	RD
Air quality	SOxNOxPM	 Construction sites Receptors such as dwellings near the alignment (e.g., the town of Tsnori and Vakiri Village) 	Measurements of exhaust emissions	 Monthly Unannounced inspections during construction works 	RD, Engineer
Air quality – dust	Fugitive dust emissions	At construction sites	Visual monitoring	Twice monthly during construction	RD, Engineer

Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How Is the parameter to be monitored?	When is the parameter to be monitored? (Frequency)	Institutional responsibility
Effects of road vehicle emissions on neighboring vineyards	 Maximum Predicted 24-hour Mean Airborne NOx Concentration (the air quality guideline for 24 hour mean NO₂ levels is 75 µg/m⁻³). Maximum predicted 24-hour mean dust deposition rate (the air quality guideline for 24 hour mean not to exceed 200 mg.m⁻².day⁻¹).* 	• NO ₂ • PM ₁₀	 NO₂ diffusion tube Dust deposition gauge To be monitored at <u>six sampling sites</u> (for both NO₂ and dust) at illustrative locations along the new road. 	 One year prior to opening of the new road Total monitoring survey duration is six months, one month for each of the site locations (this assumes that NO₂ and PM₁₀ is monitored at the same time at each location). 	RD, Engineer
Noise	Hourly average noise levels Leq, dBA.	 At noise sensitive sites, such as houses At locations where baseline noise was monitored 	Mobile noise meter	 Monthly during construction Upon complaint 	RD, Engineer
Soil erosion	 Adequacy of soil erosion prevention measures; and Soil Erosion Management Plan (see Section Error! Reference source not found.). 	All active construction sites	Visual inspection	Weekly	RD, Engineer
Soil quality	 Adequacy of soil contamination prevention techniques Adherence to Spill Response Plan (see Section Error! Reference source not found.) Texture, bulk density, pH, conductivity, cation exchange 	At all project sites including construction yards, approach roads, bridge end facilities	 Ensure no contaminated effluent is leaving from the filling area to agricultural lands. Water quality sampling of all effluent prior to discharge 	Every 3 months	RD, Engineer

Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How Is the parameter to be monitored?	When is the parameter to be monitored? (Frequency)	Institutional responsibility
	capacity, organic matter, Total N, P, K, and heavy metals				
Quarry material	Location of borrow pits according to EMP, Spoil Waste Management Plan; Soil Erosion Management Plan; Aggregate and Borrow Pits Management Plan, and Clearance, Revegetation, and Restoration Management Plan (see Error! Reference source not found.)	At all sites where quarry materials are being sourced	 Visual inspection Review of quarry Licenses and contract 	Before construction begins and inspections of the quarry site(s) every three months	RD, Engineer
Surface water quality	 (i) Testing of pH, SS, EC, Turbidity, CI, HCO3, SO4, K, Ca, Mg, Na, total P, TPH, total N, Coliform bacteria (/100ml), BOD and COD (ii) Completion of detailed terms of reference on the maintenance requirements for storm drain inlets and channels to prevent pollution of the irrigation channel. 	 Sampling at major river crossings and along the irrigation canal 	 (i) Water quality analysis using international best practice (ii) Visual inspection 	 (i) Every three months Unannounced inspections during works near watercourses (ii) During construction phase for completion prior to operation phase. 	RD, Engineer
Hydrocarbon and chemical storage	Construction camps	 Worksite Car Maintenance servicing area Staging/lay down area Campsite (if available) 	InspectionsObservations	 Monthly Unannounced inspections during construction 	RD, Engineer
Impact on planted areas	 (i) Completion of Pre- Construction Stage site survey to identify and quantify habitat types. (ii) 	Planted vegetation areas	Visual inspection	 (i) Prior to site preparation and construction phases (ii) Monthly 	RD, Engineer

Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How Is the parameter to be monitored?	When is the parameter to be monitored? (Frequency)	Institutional responsibility
	 Adequacy of Clearance, Revegetation, and Restoration Management Plan Status of vegetation Plantation survival rate 			Unannounced inspections during preparation, construction, and worksite closure phases	
Impacts on trees near the working area	 Adequacy of Clearance, Revegetation, and Restoration (see Section Error! Reference source not found.) That trees located close to the project area protected by fence 	At sites where trees and forests are located along the construction site	Visual inspection	Monthly	RD, Engineer
Possible loss or damage to cultural resources	Presence of chance finds	Dependent on findings during construction	Visual inspection	Throughout construction works	RD, Engineer, and Ministry of Culture and Monument Protection
Local Roads	Existing roads	 Local roads are not damaged Grievance and redress 	 Visual inspection 	Monthly	RD, Engineer
Traffic Safety and Management	 Haul and all affected roads as identified in the Traffic Management Plan (see Section Error! Reference source not found.) Adequacy of Traffic Management Plan 	As identified in the Management Plan	 Visual inspection 	Daily	RD, Engineer
Occupational Health and Safety	 Adherence to the approved Occupational Health and Safety Plan (see Error! Reference source not found.) Worker complaints and concerns and recorded incidents 	Worksite	 Inspection Interviews Comparisons with the Contractor's approved Occupational 	 Weekly Unannounced inspections during Construction Upon complaint 	RD, Engineer

Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How Is the parameter to be monitored?	When is the parameter to be monitored? (Frequency)	Institutional responsibility
	 Use of personal protective equipment (PPE) relevant to the task Training records Organization of traffic on the construction site Keeping to the safety rules while working on height 		Health and Safety Plan		
Drinking water and sanitation	Safe water and sanitation facilities are provided on the site	In construction yards and construction camps (if applicable)	Visual inspectionInterviews	Weekly	RD, Engineer
Community Health and Safety	 Availability of information on GRM Adequacy of construction site signage and fencing Adequacy of temporary noise mitigation measures Accidents involving public and workers Emergencies and responses Public complaints about issues such as 	All active construction sites	 Visual inspection of all active construction sites Informal interviews with nearby residents (within reason given the possible distances between sites) 	Monthly	RD, Engineer
Impacts on employment and economy	Employment of local workforce and women.	All active construction sites	The Contractor to record and provide figures regarding employment of local workforce and women to RD.	Semi-Annually	RD
Solid and Liquid Waste Management	 Adherence to Waste Code Adherence to Waste Management Plan and Laydown Area and Construction Camp 	Construction camps (if applicable) and construction sites	Visual inspection	Weekly	RD, Engineer

Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How Is the parameter to be monitored?	When is the parameter to be monitored? (Frequency)	Institutional responsibility			
	Management Plan (see Error! Reference source not found.)That solid waste is disposed at designated site							
Adherence with EMP and loan covenants	EMP /SEMPLoan covenants	All active construction sites	Visual inspectionSupervision	Semi-Annually	RD, ADB			
Operation Phase								
Post- construction site inspection	Performance checked against the management plans submitted before construction for specific aspects (e.g., Clearance, Revegetation, and Restoration Management Plan and if relevant - Spoil Waste Management Plan, and Aggregate and Borrow Pits Management Plan) (see Error! Reference source not found.).	All former construction sites	Visual inspection	Twice: two weeks before completion of construction activities and once after completion	RD, ADB			
Road safety	Proper signage and traffic control arrangements in place	Entire length of constructed section	Inspection	Recurrent	RD			
Adequate operation and maintenance of drainage systems	Drainage infrastructure in good technical condition and cleaned regularly	Entire length of constructed	Inspection	Recurrent	RD			
Regular maintenance and periodic replacement of greenery within the alignment	Trees planned for compensation of removed plants and grass seeded for slope stabilization properly safeguarded, watered as needed, and replaced when necessary	Greened areas within the ROW	Inspection	Recurrent	RD			

Issue	What parameter is to be monitored?	Where is the parameter to be monitored?	How Is the parameter to be monitored?	When is the parameter to be monitored? (Frequency)	Institutional responsibility
corridor					
Effects of road vehicle emissions on neighboring vineyards	 Maximum Predicted 24-hour Mean Airborne NOx Concentration (the air quality guideline for 24 hour mean NO₂ levels is 75 µg/m⁻³⁾. Maximum predicted 24-hour mean dust deposition rate (the air quality guideline for 24 hour mean not to exceed 200 mg.m⁻ ².day⁻¹).* 	• NO ₂ • PM ₁₀	 NO₂ diffusion tube Dust deposition gauge To be monitored at <u>six sampling sites</u> (for both NO₂ and dust) at illustrative locations along the new road. 	 Once the new road is operational Total monitoring survey duration is six months, one month for each of the site locations (this assumes that NO₂ and PM₁₀ is monitored at the same time at each location). 	RD