

Semi-Annual Environmental Monitoring Report

Project Number: 53178-001

Semestral Report (January – June 2024)

July 2024

Georgia: East-West Highway (Shorapani – Argveta Section) Improvement Project

Prepared by the Roads Department of the Ministry of Regional Development and Infrastructure of Georgia for the Asian Development Bank.

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Version	Date	Description
1.0	12/07/2024	First version of Semi-annual Environmental Monitoring Report

ABBREVIATIONS

ADB	Asian Development Bank
AP	Affected Person
BOD	Bio-Chemical Oxygen Demand
BP	Batching Plant
CAR	Corrective Action Requirement
CAREC	Central Asia Regional Economic Corridor
CC	Construction Contractor
COD	Chemical Oxygen Demand
CLO	Community Liaison Officer
CSCS	Consultancy Services for Construction Supervision
CSC	Construction Supervision Consultant
CSEMP	Contractor's Contract Specific Environmental Management Plan
dB (A)	Decibel
DO	Dissolved Oxygen
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EMP	Environmental Management Plan
EMR	Environmental Monitoring Report
ESR	Environmental Sensitive Receiver
GRM	Grievance Redress Mechanism
HIV	Human Immunodeficiency Virus
HS	Health & Safety
HSE	Health Safety and Environment
IEE	Initial Environmental Examination
IFC	International Finance Corporation
MAC	Maximum Admissible Concentration
MoEPA	Ministry of Environmental Protection and Agriculture
MoESD	Ministry of Economy and Sustainable Development
MoM	Minutes of Meeting
MRDI	Ministry of Regional Development and Infrastructure of Georgia
NCN	Non-Conformance Notice
NCR	Non-Conformance Report
NFA	National Forest Agency
NOC	No Objection Certificate
OSHA	Occupational Safety and Health Administration
PPE	Personnel Protective Equipment'

PAPs	Project Affected Persons
PIU	Project Implementation Unit
QC	Quality Control
RD	Road Department
RoW	Right of Way
SC	Supervision Consultant
SEMP	Site Specific Environmental Management Plan
SFF	State Forest Fund
SPS	Safeguard Policy Statement
STD	Sexually Transmitted Diseases
TSS	Total Suspended Solids
VG	Village Governor

TABLE OF CONTENTS

1. INTRODUCTION.....	7
1.1 Preamble.....	7
1.2 Headline Information	7
2. PROJECT DESCRIPTION AND CURRENT ACTIVITIES	8
2.1 Project Description	8
2.2 Project Contracts and Management.....	9
2.3 Project Activities during Current Reporting Period	12
2.4 Information on Personnel Working at Construction Site	14
2.5 Description of any Changes to Project Design.....	16
2.6 Description of Any Changes to Agreed Construction Methods	16
3. ENVIRONMENT SAFEGUARD ACTIVITIES	17
3.1 General Description of Environment Safeguards Activities	17
3.2 Site Audits	17
3.3. Issues Tracking.....	19
3.4 Trends.....	23
3.5 Unanticipated Impacts or Risk	24
4. RESULTS OF ENVIRONMENTAL MONITORING	25
4.1 Overview of the Monitoring Conducted During Current Period.....	25
4.2 Summary of Monitoring Outcomes.....	35
4.4 Waste Management	36
4.5 Spoil Disposal.....	37
4.6 Health and Safety	37
4.6.1 Community Health and Safety	38
4.6.2 Occupational Health and Safety	38
4.7 Training	38
4.8 Social Management and Grievance Redress Mechanism.....	39
5. FUNCTIONING OF SSEMP	39
5.1 SSEMP Review	39
6. GOOD PRACTICES	40
6.1 Good Practices.....	40
7. SUMMARY AND RECOMMENDATION	41
7.1 Summary	41
7.2 Recommendations & Follow-up Actions for the next Monitoring Period	41
ANNEXES	43
Annex 1: Project Photo log during Monitoring Period.....	43
Annex 2: Latest HS&E Inspection Report (June 2024)	50

Annex 3: Latest Water, Ambient Air Quality, Noise, and Vibration Monitoring Reports (May & June 2024).....	64
Annex 4: Sample Attendance Sheet	102
Annex 5: Clearance, Re-vegetation and Restoration Management Plan & Tree Compensation Plan	108
1. INTRODUCTION.....	141
1.1 Project Overview	141
1.2 Abbreviations	142
1.3 Purpose and Objectives of the Document.....	142
2. DETAILED DESCRIPTION OF PROPOSED COMPENSATION PLANTING LOCATIONS	143
2.1 Vegetation Cover and Habitats.....	143
2.2 Affected Tree Species.....	145
2.3 General Description of Compensation Planting Locations	146
2.4 Natural Conditions of the Planting Locations	147
2.4.1 Climate	147
2.4.2 Soils	148
3. Compensation Planting Approach.....	148
3.1 Basic Principles	148
3.2 Replacement Species	148
3.2.1 Zelkova.....	149
3.2.2 Chestnut.....	150
3.2.3 Walnut	151
4. Scope of Activities and Works	151
4.1 Saplings	151
4.2 Zelkova Propagation from Seeds (Alternative Option)	152
4.3 Planting Specifications	153
5. Pest Control Measures.....	155
6. Aftercare	157
7. Monitoring.....	158
8. Cartographic Material.....	158
9. Cost Estimate.....	174
Annex 1: Decrees of the Government of Georgia On Removal of Red List Species from Natural Environment	175
Decree N1328.....	175
Decree N2095.....	178

1. INTRODUCTION

1. The Project involves construction of a new road section of the E-60 highway located in Imereti Region of central Georgia. Section F4 forms the Shorapani-Argveta portion of the Khevi-Ubisa-Shorapani-Argveta section of the E-60 Highway Route. The Construction Contractor (The Contractor, CC) of the Project is Guizhou Highway Engineering Group Co Ltd and China National Technical Import & Export Corporation Joint Venture. The Consultant for Construction Supervision (The Engineer, CSC/SC) of the Project is UBM Uluslararası Birleşmiş Müşavirler Müşavirlik Hizmetleri A.Ş. (Turkey) and SMEC International PTY LTD (Australia). The signature date of the Contract is 16.01.2020. All environmental safeguard documents are prepared by the Contractor, approved by the Engineer, and sent to the Roads Department of the Ministry of Regional Development and Infrastructure of Georgia (the Employer, RD).

1.1 Preamble

2. This report presents the Semi-Annual Environmental Monitoring review of the Shorapani-Argveta Section (E60 Highway Route), Lot F4 Construction Project, and covers the period of January to June 2024.
3. This report is the ninth Semi-Annual Environmental Monitoring Report (SAEMR) prepared for the Project.

1.2 Headline Information

4. The Project is a newly built two-lane highway project with a total length of 14.7 km and involves the construction of a new road section of the E-60 highway, namely Lot F4, located in the Imereti region that is one of the main historical, economic, cultural and educational regions of central Georgia. Lot F4 forms the Shorapani-Argveta portion of the Khevi-Ubisa-Shorapani-Argveta section of the E-60.
5. The project involves the construction of 2x6 tunnels, 2x7 bridges, 4 interchanges, 2x1 overpasses, 5 underpasses, and 50 culverts. The length of the Project road is given below:
 - 1) Right lane (TA – meaning Tbilisi – Argveta direction) - 14.778 km,
 - 2) Left lane (AT – meaning Argveta – Tbilisi direction) - 14.726 km
6. The Project alignment is located within Zestaphoni Municipality, which covers a total area of 423 square kilometers and includes the towns of Zestaphoni and Shorapani as well as numerous small villages such as Kveda Tseva, Shorapani, Zestaphoni, Kveda Sakara, and Argveta. Besides, the alignment runs through forest areas, agricultural land plots, hilly forest slopes, residential areas, and riparian ecosystems.
7. The Project outlines (km 0+000 – 14.7+000):
 - Classification of road: Highway
 - Design speed: 100 km/h
 - Speed Limit: 80 km/h
 - Road length: 14.7 km
 - Road width: 27.60 m
 - Numbers of lanes: 2x2
 - Lane width: 3.75 m
8. The official work commencement date for the construction is 20 October 2020. The period of implementation of the contract, including the Defects Notification Period and until the issuing of the Final Acceptance and Performance Certificate is 60 (sixty) months after the Commencement Date. The project completion date has been extended by more than eight (8) months. The new target completion date is set for 30 June 2024. While the current target date is 30 June 2024, there are potential risks for additional schedule delays of three (3) to four (4) months beyond this date.

14. The project includes the construction of 12 tunnels with a total length of 8506.36 meters, 14 bridges with a total length of 5020.54 meters, 2 overpasses with a total length of 84.64 meters, 5 underpasses with a total length of 198 meters, 50 culverts with a total length of 1552.07 meters and 4 interchanges.
15. Bridges' length will vary from 32 meters to 846 meters. Tunnels will be constructed with double tubes with lengths from 399 meters to 1193 meters.
16. Technical parameters of the alignment considered during detail design include:
 - Design speed:100 km/h,
 - Speed Limit: 80 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 the paved shoulder at the central reserve: 1.0 m,
 - Total width of each paved platform: 11.0 m,
 - Width of roadbed: 27.60 m,
 - Carriageway cross-fall on straight sections: 2.5%,
 - The minimum radius of the horizontal curve: 400 m,
 - Maximum longitudinal gradient: 4%,
 - Minimum convex curve: 15 000 m, and
 - Minimum concaved curve: 15 000 m.

2.2 Project Contracts and Management

17. Information related to the project execution is given in Table 1 below:

Table 1: Project Information

Employer	Roads Department of Georgia, Ministry of Regional Development and Infrastructure of Georgia
Funding Source	Asian Development Bank
The Engineer	UBM Uluslararası Birleşmiş Müşavirler Müşavirlik Hizmetleri A.Ş. (Turkey) and SMEC International PTY LTD (Australia)
Contractor	Guizhou Highway Engineering Group Co Ltd and China National Technical Import & Export Corporation Joint Venture
Contract Number	SARP/CW/OCB-01
Contract Date of the Contractor	16.01.2020
Starting Date of Construction	20.10.2020
Contract Period	36 months (36+24 month engineer)
Original Completion Date	20.10.2023
Extended Completion Date	30.06.2024
Expired time	38 months

Remaining time	0 month
Defects Notification Period	24.3 months 730 days
Contract Price (GEL)	GEL 582 777 310.00

18. The Terms of References (ToR) for the Consultancy Services for Construction Supervision (CSCS) Contract contains the following tasks for the environmental specialists:

- Scrutinize the Contractor's construction method statement for its compliance with environmental aspects,
- Review and approve Contractor Site Specific Environmental Management Plans (EMP),
- Supervise the Contractor in all matters concerning environmental aspects,
- Monitor compliance with the EMP by the Contractor and issue Non-conformances Reports (NCR) as needed,
- Review Contractor's Corrective Action Plans (CAR),
- Review and approve temporary construction areas use and associated Site-Specific EMPs for such sites,
- Assist the Employer in undertaking and monitoring environmental safeguards,
- Identify and report any environmental issues that may arise during construction to the Team Leader and the Employer,
- Perform regular coordination with the Employer for any matters related to the implementation, monitoring, and reporting of ADB's safeguards policy.

19. The obligation of the Contractor, to safeguard, mitigate adverse impacts, and rehabilitate the environment is addressed through environmental provisions in the Fédération Internationale Des Ingénieurs-Conseils (FIDIC) conditions of the contract for construction, Multilateral Development Banks (MDB) harmonized addition- June 2010, and special clauses included in the contract related to the environment, especially, section 116 (pollution) and Appendix X of technical specifications. FIDIC clauses 4.18 (protection of the environment), 4.8 (safety procedures), 6.4 (labor laws), 16.3 (cessation of work/ remedial work), 2.3b (employer's personnel), 4.21 (progress report) are important in this regard.

20. The Contract for CSCS was awarded to UBM for three phases of the project:

- 1) Phase 1: Design review, to be completed in a period of three months and submitted to RD
- 2) Phase 2: Construction supervision and contract administration. The construction period is for 36 months (with an extension of 8 more months)
- 3) Phase 3: Defects Notification Period, 24 months

21. Contact details of ADB, SC, CC, and RD representatives are given in Table 2 below:

Table 2: Main Environmental Staff of ADB, CC, SC, and RD

Organization	Position	Name
ADB	Head Office, Senior Environment Specialist, Portfolio, Results, Safeguards and Gender Unit (PSG), CWRD	Name: Ninette Pajarillaga Contact details will be provided upon request.
	ADB National Environmental Safeguards Consultant	Name: Giorgi Kobaladze Contact details will be provided upon request.

	Associate Safeguards Officer Georgia Resident Mission	Name: Nino Nadashvili Contact details will be provided upon request
RD	Environmental Specialist	Name: Tamar Nasuashvili Contact details will be provided upon request
	Deputy Head of Environmental Unit	Name: Gia Sopadze Contact details will be provided upon request
SC	International Environmental Specialist	Emre Duran (started work on June 2022) Cell:+995577190127 e-mail: eduran@ubm.com.tr/duran.emre.tr@gmail.com
	Environmental Expert	Mari Kechkhuashvili (started work on May 2022) Contact details will be provided upon request
CC	Project Manager	Name: Chen Yuqiang Contact details will be provided upon request
	Environmental Specialist	Name: David Kurdadze Contact details will be provided upon request

22. The ongoing civil works and works' progress is given in section 2.3. All awarded contracts included EMPs cleared by ADB and any conditions of applicable national EIA clearance.
23. Under the contract, the Contractor shall comply with all applicable national and local environmental laws and regulations as well as applicable respective standards under the Contract. The Contractor is responsible to:
- Establish an operational system for managing environmental impacts,
 - Develop the SEMP as well as topic-specific EMPs by identifying environmental risks arising from the works, the mitigation measures to be applied, and monitoring to be carried out,
 - Implement the required mitigation measures and monitoring,
 - Take any corrective or preventative actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor the implementation of the EMP,
 - Submit monthly compliance reports to the engineer.
24. The Contractor, Guizhou Highway Engineering Group Co Ltd, is responsible for the implementation of SEMP throughout the project during the construction phase. The Supervision Consultant, UBM (Engineer), is responsible to:
- Monitor the implementation of SEMP by the Contractor at all its active construction sites and project-related facilities,
 - Prepare monthly and semi-annual Environmental Monitoring reports for the Employer based on the SEMP monitoring and implementation activities.
25. Responsibility for daily management for environmental monitoring and implementation of the SEMP is given to the Health Safety and Environment (HSE) Manager, Mr. Du Jun. He has direct authority from the Project Manager to give instruction to all site staff regarding environmental issues. The project organization chart for key management staff of Guizhou Highway Engineering Group Co Ltd is provided in Figure 2 and the organization chart for Health, Safety, Environmental and Social management is shown in Figure 3.

Figure 2: Contractor Project Management Staff

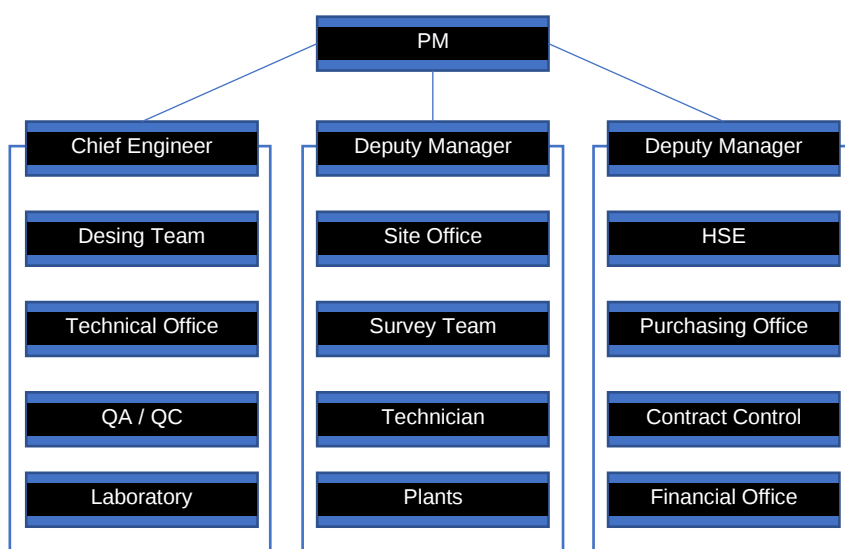


Figure 3: Contractor's H&S, Environmental and Social Organization Chart



2.3 Project Activities during Current Reporting Period

26. Table 3 provides a detailed breakdown of construction activities presently in progress across various project sections for the current monitoring and reporting period. A designated portion of the road has been made operational for public traffic during the timeframe covered by this report.

Table 3: Project Activities Carried Out during the Reporting Period

Tunnel №1 AT, Argveta side	Completed construction of invert and the final lining, filling of invert with the granular material completed as well	On-going
Tunnel №1 TA, Argveta side	Construction of invert and installation of waterproofing membrane is ongoing, final lining is ongoing as well. Completed construction of the permanent portal from Argveta side	On-going
Tunnel №2 AT and TA, Tbilisi side	Installation of waterproofing membrane and final lining construction completed, continued invert's filling with subbase material and compaction	On-going
Tunnel №3 AT	Continued excavation of the tunnel, installation of steel ribs and 20-cm shotcrete spraying, construction of invert and application of waterproofing membrane and construction of final lining	On-going
Tunnel №3 TA	Installation of steel ribs and 20-cm shotcrete spraying as well as installation of waterproofing membrane and construction of final lining is ongoing	On-going
Interchange №1	Earthworks and subbase and base preparation are ongoing	On-going
Interchange №2	Continued construction of retaining wall	On-going
Interchange №2	Earthwork for construction of embankment fill for the main road and ramps ongoing	On-going
Bridge №1 TA	Continued installation of prefabricated steel beams	On-going
Bridge №1 AT	Completed installation of rubber bearing parts	On-going
Bridge №2 TA	Completed installation of precast concrete slabs for bridge deck, steel bending and casting of bridge deck. Continued construction of New Jersey barriers	On-going
Bridge №2 AT	Completed installation of steel beams, commenced installation of precast concrete slabs for arrangement of carriageway	On-going
Bridge №3 TA	Continued construction of New Jersey barrier, installation of pre-cast concrete beams and construction of bridge deck completed for all spans	On-going
Bridge №3 AT	Continued construction of New Jersey barrier, construction of bridge deck completed for all spans, except of the last ones, continued construction of Abutment #1 and Pier #2 from Argveta side - assembling of steel cages and concrete pour is ongoing	On-going
Km 0+00 to 0+240	Cutting of slope and its protection by soil Nailing, steel mesh and shotcrete completed - Tbilisi side.	On-going
km 1+860 to km 2+060	Continued mechanical cutting of slope and installation of steel mesh for slope protection	On-going
Km 4+800 to km 5+130	Continued trimming of slope by excavators and slope protection, continue excavation of rock by jackhammer and slope protection by shotcrete	On-going
Km5 retaining wall	Continued construction of retaining wall's body and embankment fill	On-going

27. Progress of works carried out during the reporting period is summarized in Table 4 below:

Table 4: Construction Progress during Reporting Period

Row	Description of main activities	% W.F.	Progress	Cumulative Progress Including May
1	Bill No 1. General Items	0,00%	Actual	
			Planned	
2	Bill No 2. Setting Out and Site Clearance	0,23%	Actual	112.84%
			Planned	100.00%
3	Bill No 3. Earthworks	4,21%	Actual	134.40%
			Planned	99.94%
4	Bill No 4. Culverts and Drainage	1,31%	Actual	80.29%
			Planned	99.99%
5	Bill No 5. Bridges and Overpasses	46,00%	Actual	97.75%
			Planned	99.95%
6	Bill No 6 & 7 Tunnels	36,49%	Actual	74.03%
			Planned	100.00%
7	Bill No 8. Road Pavement	4,07%	Actual	75.69%
			Planned	96.30%
8	Bill No 9. Road Furniture	3,42%	Actual	73.41%
			Planned	99.31%
9	Bill No 10. Interchanges	1,81%	Actual	61.85%
			Planned	99.82%
10	Bill No 11. Relocation Of Utilities	0,94%	Actual	96.07%
			Planned	100.00%
11	Bill No 12. Greenery	0,55%	Actual	0.00%
			Planned	99.66%
12	Bill No 13. Retaining Walls	0,47%	Actual	125.44%
			Planned	100.00%
13	Bill No 14. Lighting	0,43%	Actual	51.53%
			Planned	97.76%
14	Daywork	0,05%	Actual	
			Planned	
The overall progress of the project		100,00%	Actual	89.46%
			Planned	99.79%

2.4 Information on Personnel Working at Construction Site

28. The following summarizes the overall personnel hired by the Contractor as of June 2024. Table 5 provides detailed information about personnel working at the site. Additionally, Table 6 shows the monthly change of the local and foreign staff hired.

- Total number of employees: 630
- Foreign Staff (including management, administration, and technical Staff): 201
- Local Staff (skilled and unskilled workers): 429

Table 5: Information of Personnel Working at Site as of June 2024

Positions	Number of Employees
Site Management (TL/DTL)	18

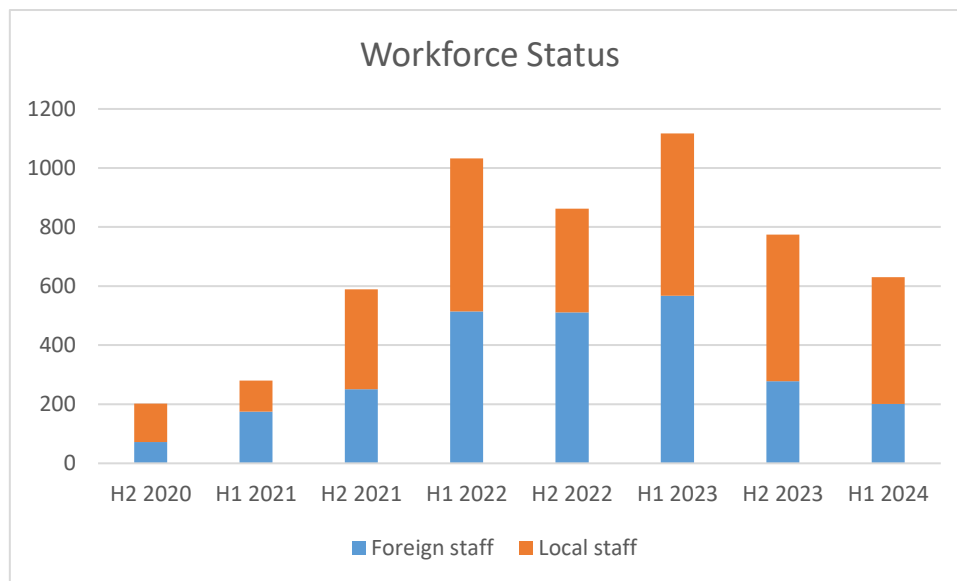
Technical Office Manager	1
Highway Engineer	7
Bridge Engineer	6
Tunnel Engineer	6
Geotechnical Engineer	4
Quality Control	9
Surveying	7
Social/Resettlement Specialist	5
Environmental Specialist	5
Health and Safety Specialist	9
Road Safety Specialist	7
Design Coordinator	9
Contract Specialist	5
Support Staff	532
Total	630
HSE Staff (breakdown of 6 personnel)	
Jun Du	HSE Manager
Giorgi Karelidze	HS officer
Mirza Bagashvili	HS officer
Giorgi Kimeridze	HS officer
Lasha Peradze	Traffic safety officer
David Kurdadze	Environmental officer

Table 6: The Monthly Change of the local and foreign personnel

Employees' origin	Jan 2024	Feb 2024	Mar 2024	Apr 2024	May 2024	Jun 2024
Local	356	283	276	252	235	201
Foreign	761	664	635	573	540	429
Total	1117	947	911	825	775	630

29. Figure 4 shows a graphical representation of the number of foreign and local staff hired by the Contractor. The total number of the Contractor's staff has decreased by 31% since the end of the second half of 2024 during this reporting period.

Figure 4: Project Workforce as of June 2024



2.5 Description of any Changes to Project Design

30. The overall project design remains unaltered from its previously established configuration. The implementation of the previously communicated Tunnel 6 variation is now finalized, allowing a road section including this area to be opened to public vehicular traffic.

2.6 Description of Any Changes to Agreed Construction Methods

31. No changes were made to the agreed-upon construction methods during this reporting period.

3. ENVIRONMENT SAFEGUARD ACTIVITIES

3.1 General Description of Environment Safeguards Activities

32. Mari Kechkhuashvili was assigned as a local Environmental Specialist in May 2022, and Emre Duran was assigned as the International Environmental Specialist in June 2022 as part of the Engineer's environmental team. The team's responsibilities include checking the environmental impacts caused by the construction activities and ensuring compliance with the requirements of EIA, SEMP, and topic-specific EMPs.
33. The Engineer's environmental team prepares monthly and semi-annual reports to be submitted to the Resident Engineer (RE). These reports depict the ongoing construction activities, environmental issues, health and safety issues, grievance status, implementation of mitigation measures defined in the EIA, and compliance status. As of June 2024, five monthly reports have been submitted to the RE (as an environmental section in the Engineer's Monthly Progress Report). The general issues in the reports are given in Section 3.3, "Issues Tracking".
34. The environmental teams of the Contractor and the Engineer conduct regular site visits to monitor compliance with the SEMP. The details of the environmental site visits are given in Section 3.2, "Site Audits".
35. The Construction Contractor hired a consultant (Sustainable Development Solutions Caucasus (SDSC) LLC) to prepare environmental management plans and required environmental reports, and to conduct instrumental monitoring studies per EIA requirements.
36. The Contractor's and Engineer's social teams maintain the Grievance Redress Mechanism (GRM). The details of the GRM logbook are given in Section 4.8, "Social Management and Grievance Redress Mechanism".
37. To ensure project safety, both Contractor and Engineer Health and Safety (H&S) teams conduct regular site visits to monitor compliance with H&S rules, traffic safety, and other safety concerns. The Engineer's H&S team maintains a log that tracks both open and closed issues (presented in a report format). Details of these logs can be found in Section 3.3, "Issue Tracking".

3.2 Site Audits

38. Weekly or bi-weekly site visits were carried out by the local environmental specialist of the Engineer, Ms. Mari Kechkhuashvili, to the following sites/processes:
 - Office sites,
 - Camp areas,
 - Access roads,
 - Concrete batching plant No 1 & 2 (new),
 - Cutting of trees,
 - Interchange 1 & 2,
 - Tunnel 1, 2, 3,4 & 3 Portals,
 - All Bridges
 - Tunnel 6 cut and cover area
 - Steel Bar Processing Plant.
39. Mr. Emre Duran, the International Environmental expert, also attends bi-weekly site visits when he is on-site. Additionally, the Contractor's Environmental team also participates in the scheduled site inspections.
40. The inspection method includes visual inspection, interviews with workers, review of permits obtained, and monthly reports.
41. The summary of site visits and the issues encountered during site visits are given in Table 7.

Table 7: Summary of Site Visits and of the Environmental Team During the Reporting Period (Jan-Jul 2024)

Date of Site Visit	Locations	Environmental Issue
08.01.2024	Worker's Camp No 2 & 3	- Poor conditions at sanitary facilities in several camps, with missing soap, toilet paper, and paper towels. Direct discharge of greywater - Poor housekeeping - Inadequate waste management for scrap metals
15. 01. 2024	Worker's Camp No 4; Batching Plant No:1	- Poor condition of sanitary situation - Hazardous waste was improperly dumped at the campsite - Batching plant wastewater ponds are full of sediments, and water containing silt and concrete residues is discharged into the river
22.01.2024	Worker's Camps Camp No 2, 3 & 6, Batching Plant, Interchange 2, Hazardous Waste Storage Area, Batching Plant No:2, Road Construction KP 10-12	- Sanitary facilities have poor conditions, including missing soap, toilet paper, and paper towels - Poor housekeeping practices - Household waste management - Incorrect hazardous waste management - Improper storage of hazardous materials - Dust generation during heavy machinery working and transportation - Batching plant wastewater ponds are full of sediments, and water containing silt and concrete residues is discharged into the river
31.01.2024	Worker's Camps Camp No 1 Uznadze street Batching plant No: 1	- Batching plant wastewater ponds are full of sediments, and water containing silt and concrete residues is discharged into the river - Poor condition of sanitary facilities
12.02.2024	Worker's Camps No: 2 & 3	Poor housekeeping practices
14.02.2024	Spoil Disposal Sites 1,2 & 3, Riverbanks	- Height of Spoil Disposal Sites - River Protection requirements of Spoil Disposal Sites - Riverbed restoration - Slope stability of the several embankments
15.02.2024	Worker's Camps	- Household waste management - Poor housekeeping practices - Domestic wastewater management - Hazardous waste management - Batching plant wastewater management
20.02.2024	Worker's Camp No 2 & 6, Batching Plant No: 1, Batching Plant No: 2; Spoil Disposal Area 1 & 2	- Gray water management problems - Poor housekeeping practices - Household waste management - Batching plant wastewater management
25.03.2024	Regular Site Visit of ADB Team	-
26.03.2024	Batching Plant No: 2; Tunnel Portal No 3	- Poor waste management - Improper spoil storage
08.04.2024	Near camp 6	Topsoil arrangement near the camp 6
15.04.2024	Near the tunnel 5 Batching plant	- A lot of dust near the tunnel 5 - Batching plant wastewater management
24.04.2024	Tunnel 4 working area, Worker's Camp No 1, Batching Plant No: 1	- Polluted areas with waste, It require regular cleaning - Batching plant wastewater management
02.05.2024	Spoil Disposal Site 1, 2 & 3; Riverbanks, Batching Plant No: 1; Tunnel Portal 4 &	- Height of Spoil Disposal Site No:1 - River Protection requirements of Spoil Disposal Sites - Riverbed restoration process - Temporary storage of spoil material issues - Drainage problems in the Spoil Disposal Site No:3

	5; Temporary Spoil Disposal near Tunnel Portal 5 Argveta Site	
06.05. 2024	Batching plant No:1	Inadequate sediment management
13.05.2024	Worker's Camp No: 2 & 4; Spoil Disposal Area 1 & 2	- Gray water management problems - Poor housekeeping practices - Household waste management - A lot of waste material in the disposal areas, needs river bank protection
20.05.2024	Workers camp No 1 & 4, Batching plant No:1, Disposal areas No:1 & 2	- Batching plant waste water management - Improper storage of hazardous materials - The height of the spoils disposed in the spoil disposal No: 1 area is not appropriate - Inadequate waste management for scrap metals - Incorrect hazardous waste management - Poor waste management and housekeeping practices observed
28.05.2024	Disposal area N1, N2	Poor management of dumping materials, needs to be protected river
06.06.2024	General Site Visit of ADB Team	-
07.06.2024	3 rd Party Environmental Audit -	Interchange No:1, 2 & 3, Batching Plant No: 1 & 2, Worker's Camp No: 1, 2, 3 & 4, Hazardous Waste Storage Area, Workshop No: 1 & 2, Spoil Disposal Area No:1 & 2 were visited and the auditor company will prepare an audit report
17.06.2024	Worker's Camps Camp No 2 & 3; Batching Plant No : 1, Interchange 2,	- Sanitary facilities have poor conditions, including missing soap, toilet paper, and paper towels - Poor housekeeping practices - Household waste management - Batching plant wastewater ponds are full
27.06.2024	Worker's Camp No 2; Batching Plant No:1	- Poor condition of sanitary facilities - Batching plant wastewater ponds are full

42. In the process of demobilization, the Contractor began to reinstate a portion of the worker camps and certain work completion sites. These areas included: Worker's Camp No. 3 (partially), Worker's Camp No. 4 (partially), Worker's Camp No. 5, and a section of Spoil Disposal Site No. 2. Photographs documenting the reinstated areas are presented in Annex 1.

43. There is no new NCR in this reporting period.

3.3. Issues Tracking

Environmental Issues

44. The Contractor has obtained all the required permits required at this stage and has also developed a Compensation Tree Planting Plan (see Annex 5).

45. The Environmental team tracks the statistics of the environmental issues during the reporting period, which is given in Table 8. The status of the issues is given in Figure 5.

46. The Engineer has submitted the identified issues to the Contractor through mail notifications, official letters, and verbally, when appropriate, to take corrective actions. Of the 112 issues identified, 101 have been closed, including 16 remaining issues from the previous monitoring period. There are 11 remaining issues that will be followed up in the next semi-annual report.

47. The primary environmental concerns include wastewater discharge from the batching plant, uncontrolled sewage and grey water discharges, waste management, dust during the dry season, hazardous waste management, and sanitation at the WCs and shower areas. Despite multiple

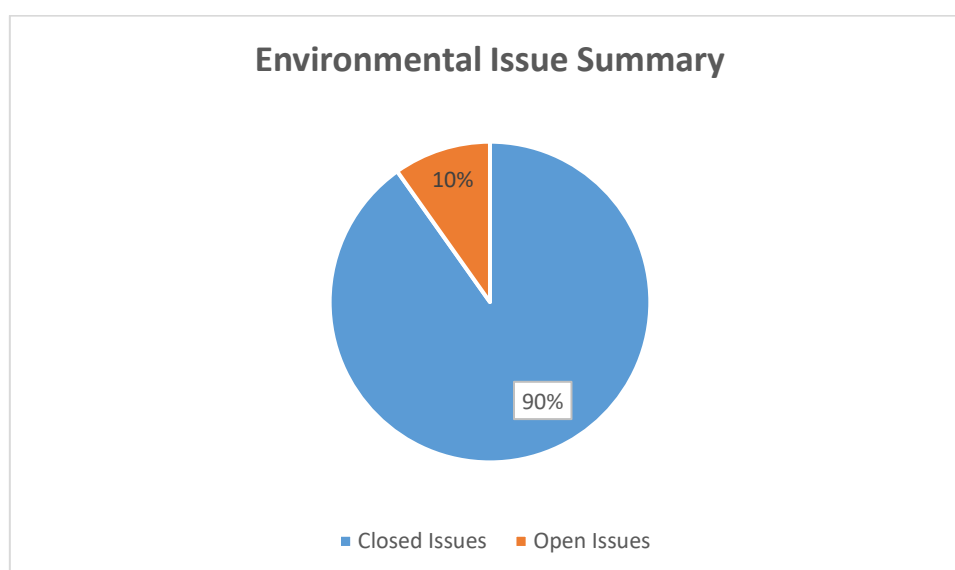
warnings from the Engineer about these issues in different locations, the Contractor has only addressed some of them promptly, leaving several issues unresolved.

48. There are several important open environmental issues. Those include the river protection requirements of spoil disposal sites, which necessitate stringent measures to prevent any contamination or disruption to the river ecosystem. Equally important is the riverbed and riverbank restoration process to restore any damage caused during construction and maintain the natural habitat. Temporary storage of spoil materials in different areas should be managed according to the Georgian legislations to minimize erosion and sedimentation from those areas. Additionally, drainage problems in the spoil disposal site No: 3 must be effectively managed to prevent waterlogging and potential contamination of surrounding areas. The height of the spoils disposed in the spoil disposal site No:1 should be carefully controlled to avoid instability and excessive land use and potential visual impact on the surrounding area. Lastly, batching plant wastewater management is critical to prevent harmful chemicals from entering the water bodies, thus protecting aquatic life and maintaining water quality.

Table 8: Summary of Environmental Issue Tracking for the Reporting Period

Issues opened during this reporting period	96
Pending Issues from the previous reporting period	16
Issues closed this reporting period	101
Number of open issues	11
Closed in percentage	90 %

Figure 5: Environmental Issue Summary during the Monitoring Period



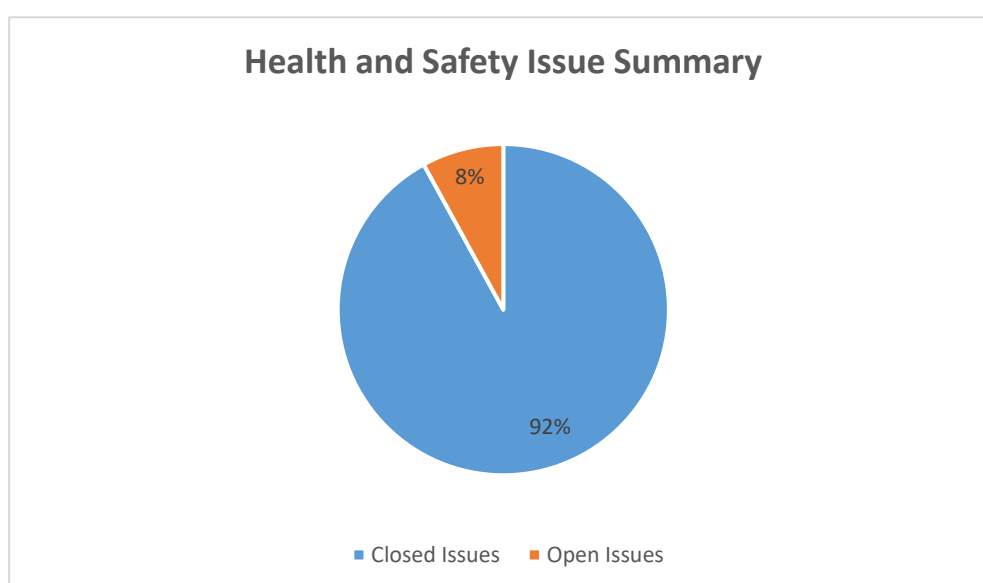
Health and Safety Issues

49. The H&S team is also tracking H&S issues (“good” and “bad” behavior and performances), and their statistics during the reporting period are given in Table 9.
50. The primary health and safety concerns identified include inadequate housekeeping, improper material storage, electrical safety issues involving electrical boxes and transmission cables, damaged lifting equipment, faulty tools and equipment, unsafe practices when working at height, inconsistent use of personal protective equipment (PPE), hazardous and makeshift equipment, poor road conditions, inadequate fire extinguishers, unguarded deep excavations, and driving safety hazards. However, some locations demonstrated positive practices such as proper PPE usage, effective barriers. The Contractor has promptly addressed some issues in accordance with Company health and safety regulations, while others are scheduled for correction in the coming weeks following the reported observations.
51. Data on the number of closed and open issues is presented in Table 9 and Figure 6. This data is based on the observed issues that have been closed or remained open during the Project. Out of four hundred and sixty-one (461) issues, four hundred and eleven (421) issues were closed, and there are forty (40) issues remaining for the next semi-annual report to follow up.

Table 9: Summary of Health and Safety Issue Tracking for the Reporting Period

Good behavior and performances during this reporting period	146
Issues opened during this reporting period	415
Pending Issues from the previous reporting period	46
Issues closed this reporting period	421
Number of open issues	40
Closed in percentage	92%

Figure 6: H&S Issue Summary during the Monitoring Period



52. Identified non-conformities that occurred in work sites were issued to the Contractor through inspection reports (Annex 2) by the Engineer to take corrective actions.

3.4 Trends

Environmental

53. To ensure a healthy environment at the construction site, the following recurring issues must be resolved.
54. To address the observed occasional leaks in septic tanks, the frequency of septic tank pumping should be increased to prevent such leaks, which can cause environmental pollution by affecting soil and water sources. Therefore, regular inspection and maintenance of septic systems and related pipes are crucial to reduce their environmental impact.
55. Repair issues in the greywater system need attention. Greywater systems treat and reuse wastewater, but deficiencies and malfunctions can hinder their effective operation. Regular inspection, identification, and repair of these issues are essential.
56. There are also deficiencies in environmental organization and waste collection. Increasing waste collection and sorting efforts, along with assigning specific personnel to manage waste collection and segregation in sites and camps, is necessary. As it is not feasible for the environmental team to manage all areas, specialized teams should be designated for waste collection and segregation. The number and capacity of waste containers should be increased, and metal scraps stored inappropriately in some areas need to be quickly removed.
57. Seasonal dust generation should be mitigated by increasing the frequency of watering in relevant areas during the dry season, as dust from construction sites can impact worker health and contribute to environmental pollution.
58. Adequate storage and proper placement of hazardous waste containers, such as those for fuel and oils, should be ensured on-site, and regular collection of waste generated from these materials should be conducted to prevent leaks and pollution.
59. The batching plant wastewater issue must be resolved to prevent hazardous chemicals from draining into the river and causing environmental pollution. To solve this issue sedimentation traps should be more frequently changed and the amount of the excess water coming to the sediment traps should be diminished. Resolve the issue of wastewater from the batching plant to prevent hazardous chemicals from draining into the river and causing environmental pollution. This can be achieved by more frequent cleaning of sedimentation traps and reducing wastewater volume.

Health and Safety

60. The following items represent recurring health and safety issues at the construction site that need to be addressed.
61. There are concerns regarding electrical safety at the site. Proper measures should be taken to ensure safe electrical installations, usage, and maintenance. This involves regular inspections of electrical components (such as boxes and transmission cables), ensuring proper grounding, and enforcing the use of suitable personal protective equipment (PPE) by all workers.
62. Working at heights poses significant risks if not managed properly. Adequate fall protection systems, such as guardrails, safety nets, or personal fall arrest systems, should be implemented to prevent accidents and protect workers from falls.
63. There are issues related to inadequate lighting inside tunnels. Sufficient and appropriate lighting should be installed to ensure clear visibility and prevent accidents or injuries caused by poor illumination.

64. Proper ventilation is crucial in tunnels to maintain air quality and prevent the accumulation of hazardous gases, dust, or fumes. Adequate ventilation systems should be in place and regularly maintained to create a safe working environment for the workers.
65. There are concerns regarding the use of inappropriate equipment and tools, such as hand-held cutters, ladders, etc. It is important to ensure that workers are provided with suitable and well-maintained equipment and trained on their correct usage. Regular checks and inspections should be conducted to identify and address any equipment-related hazards.
66. There are some issues with poor housekeeping. Poor housekeeping often leads to clutter and obstructions in work areas. Accumulation of materials, tools, equipment, and other objects in walkways and workspaces can create tripping hazards. Untidy workspaces with scattered debris, liquids, or loose objects increase the risk of slip, trip, and fall accidents. Poorly managed storage of flammable materials, chemicals, and waste can create fire hazards. The Contractor should address poor housekeeping with a proactive approach that involves regular cleaning, proper storage and organization of tools and materials, clear labeling, designated waste disposal areas, and ongoing training and awareness programs for employees.
67. The Contractor has been actively addressing and resolving most of the identified environmental and health & safety issues on a regular basis. However, it should be noted that certain issues have been recurring due to workers' behavior and limitations in terms of personnel and resources. In light of this, the Engineer has recommended that the Contractor undertake regular training sessions and toolbox meetings to enhance workers' awareness and compliance with HSE regulations. Additionally, it is advised to allocate more personnel and resources to effectively tackle HSE issues.

3.5 Unanticipated Impacts or Risk

68. As the project approaches completion, several critical issues require sensitive handling and adherence to established management plans. These include reinstatement all impacted areas including spoil storage areas, restoring riverbeds and banks, implementing river protection measures at spoil disposal sites, managing temporary spoil storage areas, and overseeing tree planting initiatives. All associated work must be executed in strict accordance with the relevant management plans.

4. RESULTS OF ENVIRONMENTAL MONITORING

4.1 Overview of the Monitoring Conducted During Current Period

69. Six monthly sampling sessions were conducted during the reporting period. Due to the completion of construction works near some places, several water quality measurements, air quality measurements and noise and vibration were not concluded during several months of during the reporting period.
70. The sampling locations for air, noise, vibration, and water quality were selected considering the ongoing construction activities, as shown in Figure 7 and Figure 8. The objective was to evaluate the potential impacts on the environmentally sensitive receptors resulting from the construction activities. The results of the instrumental monitoring are given below in tabular form.

Figure 7: Surface Water Quality Sampling Locations

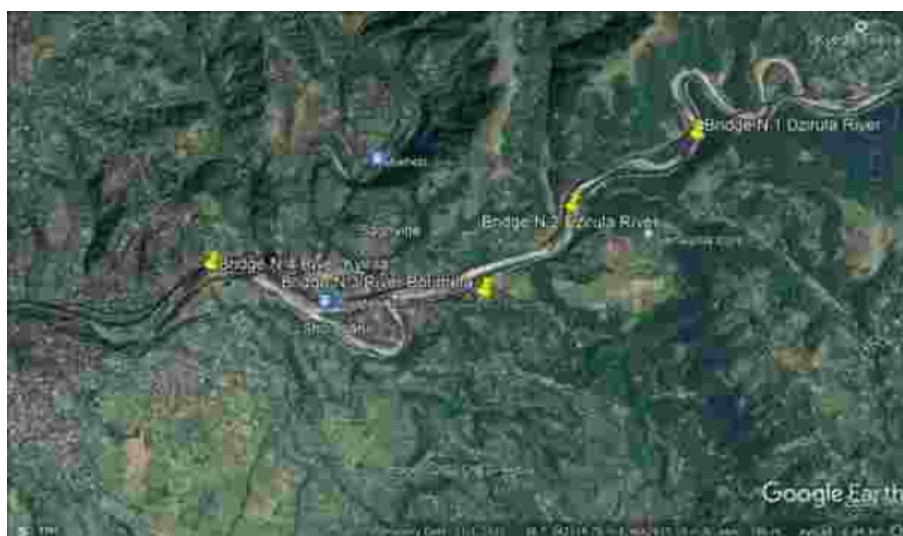
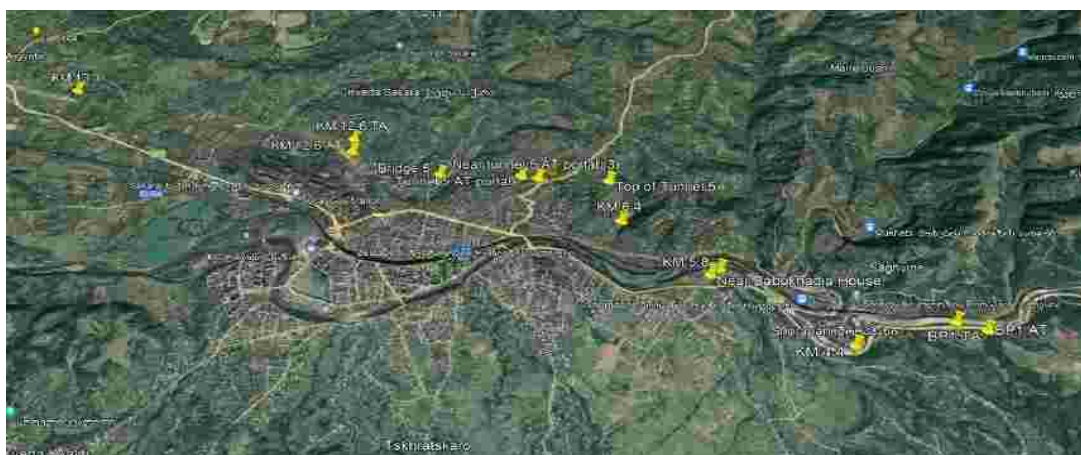


Figure 8: Noise, Vibration, and Ambient Air Quality Sampling Locations



Surface Water Quality

71. Six monthly sampling sessions were conducted for surface water quality analysis during the reporting period of January–June 2024. The samples were collected from River Dzirula (Bridge N1) and River Borimela (Bridge N3) as shown in Table 10. The samples were taken 50 meters upstream and 50 meters downstream (where possible) from the construction site to evaluate the water quality difference before and after the construction activities. Construction near Bridge N2 and Bridge N4

was completed, resulting in the absence of sampling at these points (River Dzirula and River Kvirila) during this reporting period.

72. The results are given in Table 11 and Table 12. TSS parameter change during the reporting period are shown in Figure 9 and Figure 10.
73. Over several months of monitoring, the downstream Total Suspended Solids (TSS) levels in the Borimela River have been high but have not exceeded the baseline levels. This is not the case for the Dzirula River. High TSS levels in downstream monitoring can result from various factors. For instance, soil erosion due to earthmoving and excavation activities can lead to the exposure of bare soil, resulting in the runoff of eroded particles into the river. Construction sites near riverbanks can destabilize the soil, causing increased erosion and contributing to higher TSS levels. Additionally, improper disposal of construction waste, including materials like concrete and gravel, near or in the river can further degrade water quality. To address this issue, a comprehensive approach is recommended. First, implement erosion control measures like silt curtains downstream to trap sediment, sediment traps within the work zone to collect soil particles, and blankets on exposed soil to prevent erosion. Second, optimize construction practices by minimizing in-stream work, reducing dredging if necessary with proper disposal, and scheduling work during the dry season. Finally, for a long-term solution, riverbank stabilization with native plants after construction is required.
74. Moreover, wastewater discharge from batching plant may also contribute to an increase in TSS levels. To address this issue, implementing water treatment measures at batching plants, such as sedimentation basins or filtration systems, can help minimize the impact of wastewater discharge on river water quality.
75. To comprehensively manage environmental concerns, it is crucial to integrate these solutions with effective erosion control measures and regulatory compliance throughout the construction process. Regular monitoring of TSS levels remains essential for assessing and mitigating potential environmental impacts.
76. Additionally the Contractor must not discharge untreated sewage water or dispose of hazardous wastes into rivers. These actions are prohibited by the EIA requirements. Hazardous materials should be stored and managed appropriately and kept away from water sources.

Table 11: Surface Water Quality Monitoring Locations

Location	Coordinates	
	X	Y
River Dzirula (Bridge N1)	340316.57	4663074.32
River Borimela (Bridge N3)	343185.48	4662005.84

Table 11: Surface Water Analysis Results of Dzirula River (Bridge N1) Up and Down Stream

Parameters	Unit	EIA Standards (National MAC)	Baseline results- Upstream (<i>Feb 2022</i>)	Baseline results- Downstream (<i>Feb 2022</i>)	Upstream (Jan 2024)	Downstream (Jan 2024)	Upstream (Feb 2024)	Downstream (Feb 2024)	Upstream (Mar 2024)	Downstream (Mar 2024)	Upstream (Apr 2024)	Downstream (Apr 2024)	Upstream (May 2024)	Downstream (May 2024)
pH	-	6.5-8.5	7,85	7,87	8,11	8,14	6,80	6,75	7,78	8,08	8,27	8,13	8,27	8,13
BOD	mg/L	6,00	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
TSS	mg/L	Increase no more than 0.75 mg/L	10	12,00	12	10	7	8	6	8	7	6	7	6
Total N	mg/L	NA	1,50	1,20	0,14	0,12	0,1	0,11	0,2	0,2	0,12	0,13	0,12	0,13
Total P	mg/L	2,00	0,20	0,28	0,09	0,1	0,06	0,06	0,07	0,08	0,07	0,06	0,07	0,06
Nitrates	mg/L	40,00	<1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phosphates	mg/L	3,50	0,79	0,80	0,28	0,32	0,18	0,18	0,2	0,24	0,21	0,18	0,21	0,18
Oil and Grease	mg/L	0.3	<0,3	<0,3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

Not 1. The parameters with red color are higher than the National MAC levels at that analysis period.

Not 2. The highlighted parameters are significantly higher than the upstream levels at that analysis period.

Table 12: Surface Water Results of Borimela River (Bridge N3) Up and Down Stream

Parameters	Unit	EIA Standards (National MAC)	Baseline results (<i>June 2021</i>)	Upstream (Jan 2024)	Downstream (Jan 2024)	Upstream (Feb 2024)	Downstream (Feb 2024)	Upstream (Mar 2024)	Downstream (Mar 2024)	Upstream (Apr 2024)	Downstream (Apr 2024)	Upstream (May 2024)	Downstream (May 2024)	Upstream (Jun 2024)	Downstream (Jun 2024)
pH	-	6.5-8.5	8,16	8,19	8,13	7,03	7,14	8,06	8,05	8,78	8,04	8,12	8,16	8,20	8,25
BOD	mg/L	6,00	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
TSS	mg/L	Increase no more than 0.75 mg/L	20,00	8,00	11,00	6,00	7,00	5,00	9,00	6,00	5,00	12,00	19,00	15,00	20,00
Total N	mg/L	NA	1,50	0,15	0,10	0,08	0,08	0,10	0,10	0,40	0,10	0,60	0,80	0,70	0,90
Total P	mg/L	2,00	0,150	0,10	0,14	0,08	0,07	0,08	0,10	0,08	0,08	0,06	0,08	0,07	0,10
Nitrates	mg/L	40,00	4,00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Phosphates	mg/L	3,50	0,45	0,30	0,42	0,24	0,21	0,24	0,30	0,28	0,24	0,18	0,24	0,21	0,30
Oil and Grease	mg/L	0.3	<0,1	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3

Parameters	Unit	EIA Standards (National MAC)	Baseline results (<i>June 2021</i>)	Upstream January 2024)	Downstream January 2024)	Upstream February 2024)	Downstream February 2024)	Upstream March 2024)	Downstream March 2024)	Upstream April 2024)	Downstream April 2024)	Upstream 2024)
pH	-	6.5-8.5	8,16	8,19	8,13	7,03	7,14	8,06	8,05	8,78	8,04	8,12
BOD	mg/L	6,00	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
TSS	mg/L	Increase no more than 0.75 mg/L	20,00	8,00	11,00	6,00	7,00	5,00	9,00	6,00	5,00	12,00
Total N	mg/L	NA	1,50	0,15	0,10	0,08	0,08	0,10	0,10	0,40	0,10	0,60
Total P	mg/L	2,00	0,150	0,10	0,14	0,08	0,07	0,08	0,10	0,08	0,08	0,06

Nitrates	mg/L	40,00	4,00	<1	<1	<1	<1	<1	<1	<1	<1	<1
Phosphates	mg/L	3,50	0,45	0,30	0,42	0,24	0,21	0,24	0,30	0,28	0,24	0,18
Oil and Grease	mg/L	0.3	<0,1	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3	<0,3

Not 1. The parameters with red color are higher than the National MAC levels at that analysis period.

Not 2. The highlighted parameters are significantly higher than the upstream levels at that analysis period.

Figure 9: Dzirula River (Bridge N1) Upstream and Downstream TSS Chart (July-December 2023)

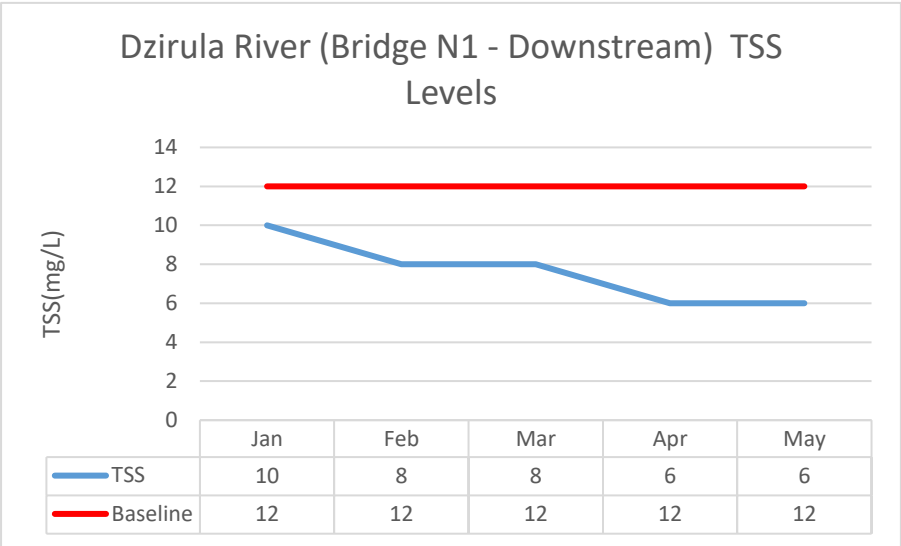
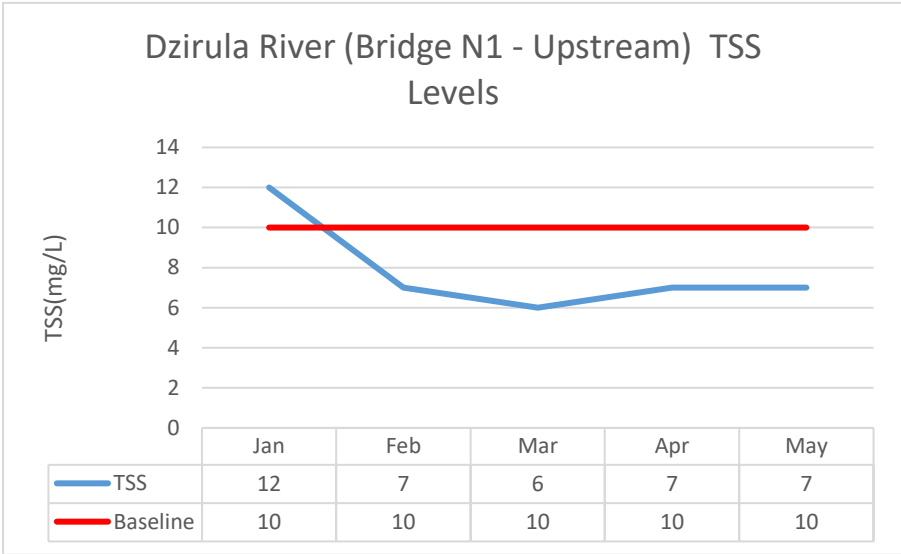
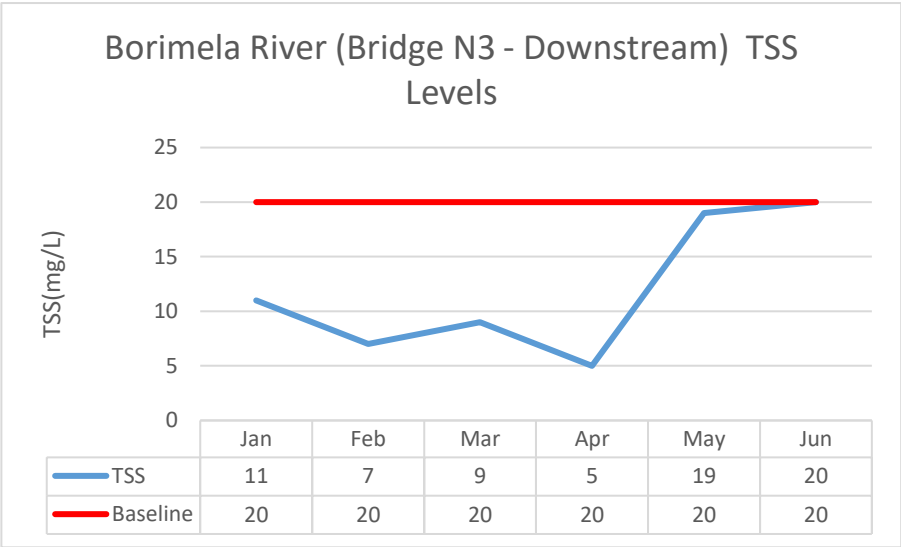
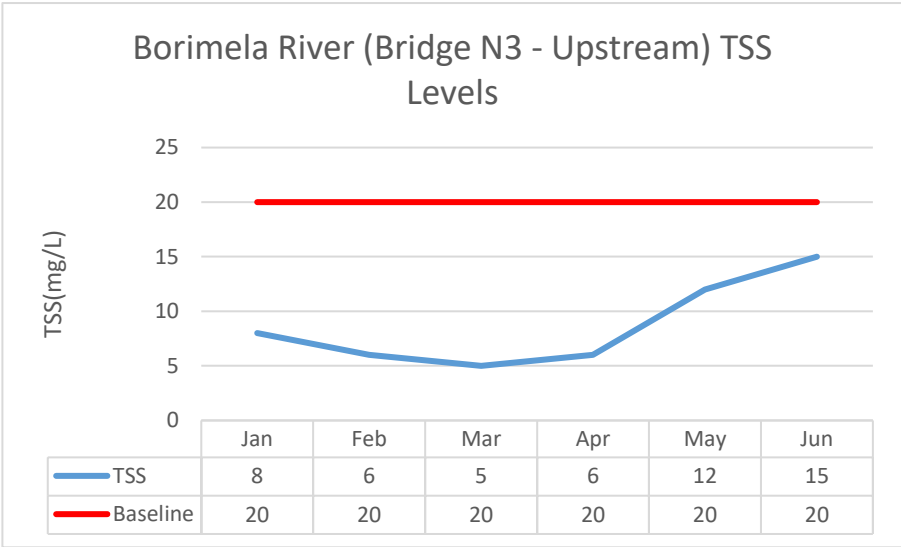


Figure 10: Borimela River (Bridge N3) Upstream and Downstream TSS Chart (July-December 2023)



Noise and Vibration Monitoring

77. The Contractor and the Engineer selected noise monitoring locations to evaluate the impact on noise-sensitive receptors (NSR) due to various construction activities during the reporting period. The locations are given in Table 13.

Table 13: Noise Monitoring Locations

Location	Coordinates	
	X	Y
BP1 TA	342363	4661841
Nika Kvizhinadze's house (Spoil Disposal Area 2)	340247	4662834
Tunnel 6 (construction site - Goga Kurtshalia's house)	337519	4664777
New Batch Plant	336335	4665760
Lali Charkviani's house	337681	4664637

78. The average equivalent noise levels (LAeq) recorded during different monitoring locations and periods are shown in Table 18 and compared with the daytime IFC limits of 55 dB(A) for residential areas and educational institutions.
79. Overall, the LAeq results vary between 43.3 dB(A) to 72.2 dB(A), with the upper range of measurements high for the receiving environment. However, according to the outdoor-indoor noise reduction (OINR) by the Federal Highway Administration US Department of Transportation, 'Noise Measurement Handbook (FHWA-HEP-18-065)', if the windows are closed, the noise reduction in the interior of the building with masonry structure and a single glazed window would be up to 25 dB(A). On the other hand, the reduction is 10 dB(A) with open windows. Therefore, a slightly higher noise level outside the building would not be felt inside the building by the residents. Moreover, the Consultant measured noise levels close to the active construction sites, which will decrease with distance.
80. Observations indicate that noise levels exceed established standards at specific measurement points. Instances of excessive noise are primarily due to the operation of heavy machinery, which generates noise beyond permissible levels. The proximity of these machines amplifies their impact on the surrounding environment. Additionally, increased vehicular traffic from ongoing construction activities and regular traffic around monitoring points contribute to elevated overall noise levels. To address these issues, the Contractor should develop targeted mitigation strategies, including the installation of noise barriers around construction sites, scheduling noisy activities during less sensitive times of the day, using quieter machinery and equipment, implementing regular maintenance to ensure machinery operates efficiently, and enforcing speed limits to reduce traffic noise. These measures aim to minimize the noise impact on the surrounding environment and ensure compliance with established standards. Let me know if there are any other changes or additions you'd like!.

81. The Contractor and the Engineer selected vibration monitoring locations to evaluate the impact on the sensitive receptors due to various construction activities during the reporting period. The vibration monitoring locations are given in Table 14.

Table 14: Vibration Measurement Locations

Location	Coordinates	
	X	Y
BP1 TA	342363	4661841
Gocha Kapanadze's house (T6) W	337585	4664602
Tunnel 6 (construction site - Goga Kurtskhalia's house)	337519	4664777
New Batch Plant	336335	4665760
Lali Charkviani's house	337681	4664637

82. According to the criteria set in the EIA, based on BS 6472 and German standard DIN 4150-3: 1999, there is no damage likely to structure building due to vibration at peak particle velocity (PPV) less than 5 mm/sec, risk of cosmetic damage from 5 to 15 mm/sec, and risk of structural damage at PPV greater than 15 mm/sec.
83. Table 15 presents vibration results that exceed the Georgian legislation limit (1.5 mm/s) in two locations during three monitoring sessions.
84. The highest measured level at the new batching plant attributed to the simultaneous operation of the compactor and the hydraulic hammer, which was also accompanied by the movement of heavy trucks.
85. To address the elevated vibration levels caused by heavy machinery, construction activities, and geological factors, several solutions can be implemented. Vibration isolation techniques, like using springs or pads under machinery, can absorb vibrations at the source. Alternative construction methods with lower vibration impact, such as prefabricated elements or trenchless technologies, can be employed where possible. Finally, geotechnical investigations can identify problematic geological conditions, allowing for targeted reinforcement or vibration dampening strategies in those areas. By implementing a combination of these solutions, significant reductions in vibration levels can be achieved.
86. It's important to note that while the vibration levels surpass the Georgian legislation limit (1.5 mm/s), they remain well within the permissible range outlined in the Environmental Impact Assessment (EIA) and contract conditions.

Table 14: Average Equivalent Noise Levels Result during the Monitoring Period

Location/ Month	Average Equivalent Noise level (LAeq) Measurement dB(A)				
	BP1 TA	Nika Kvizhinadze's house	Tunnel 6 (construction site - Goga Kurtskhalia's house)	New Batch Plant	Lali Charkviani's house
Jan-24		60,5	57,7	53,3	61,4
Feb-24		59,0	54,1	72,2	53,9
Mar-24		56,8	48,8	58,5	45,3
Apr-24	67,5		58,8		
May-24	62,5		57,6		

Table 15: Vibration Monitoring Results

Location/Session	Month	Peak Particle Velocity (PPV) mm/sec			Peak Vector Max Values		Legislation limits	
		Transversal Y	Vertical Z	Longitudinal X	mm/sec	db	mm/sec	db
Spoil Disposal Area N2	Jan	0,244	0,095	0,434	0,438	78,80	1,100	67 (+10)
	Feb	0,173	0,110	0,221	0,264	74,50	1,100	67 (+10)
	Mar	0,370	0,292	0,347	0,480	79,60	1,100	67 (+10)
Lali Charkviani's house	Jan	0,102	0,134	0,126	0,154	69,80	1,100	67 (+10)
	Feb	0,142	0,126	0,110	0,169	70,60	1,100	67 (+10)
	Mar	0,126	0,110	0,126	0,190	71,60	1,100	67 (+10)
Goga Kurtskhalia's house	Jan	0,126	0,095	0,110	0,169	70,60	1,100	67 (+10)
	Feb	0,263	0,124	0,180	0,263	74,40	1,100	67 (+10)
	Mar	0,126	0,110	0,142	0,179	71,10	1,100	67 (+10)
New Batch Plant	Jan	0,126	0,110	0,110	0,142	69,20	1,100	67 (+10)
	Feb	1,561	2,010	1,710	2,097	92,50	1,100	67 (+10)
	Mar	0,205	0,142	0,221	0,291	75,30	1,100	67 (+10)

Air Quality Monitoring

87. Air quality monitoring locations were selected to evaluate the impact of the construction activities on the nearest sensitive receptors. Table 16 shows the measurement locations for dust monitoring. During this reporting period, there were no passive NO_x and SO_x samplings.

Table 16: Air Quality Measurement Locations

Location	Measurement	Coordinates	
		X	Y
Batch Plant 1 (BP1) TA	PM	342363	4661841
Spoil disposal area N2/ Nika Kvizhinadze's house	PM	340247	4662834
New Batch Plant	PM	336335	4665760
Lali Charkviani's house	PM	334232	4666354
Gocha Kapanadze's house (Tunnel 6)	PM	337519	4664777

88. There is only one instance where the air quality test result, as indicated in Table 17, exceed the national air quality limits in Georgia (150 micrograms/m³) at the batching plant measurement point for No: 1 (BP1).. Despite this instance, all other measurements fall within the national limits.
89. Elevated PM level at the batching plant measurement point can be attributed to various factors. These include the operation of heavy machinery, material handling processes, and the lack of adequate dust control measures. Environmental conditions, such as dry and windy weather, along with seasonal variations, contribute to the suspension of particulate matter. Effective dust control measures, proper equipment maintenance, and adherence to environmental regulations are crucial for mitigating PM emissions.

Table 17: Air Quality (PM) Measurement Results

Location	Session	PM ₁₀ (µg/m ³)			PM _{2.5} (µg/m ³)			PM _{Total} (µg/m ³)		
		30 Min Avg.	min	max	30 Min Avg.	min	max	30 Min Avg.	min	max
Nika Kvizhinadze's house / Spoil disposal area N2	February	41	26	54	20	13	25	41	26	54
	March	124	36	299	34	12	128	124	36	299
Lali Charkviani's house	February	54	22	91	18	11	29	54	22	91
	March	30	21	46	14	11	19	30	21	46
Tunnel 6 (2)	February	68	37	168	31	24	35	68	37	168
	March	124	36	299	34	12	128	124	36	299
New Batch Plant	February	42	16	207	16	8	45	42	16	207
	March	110	26	777	35	12	193	110	26	777
	April	67,35	37	343	24,3	18	51	67,35	37	343
	May	13	4	56	4	2	6	13	4	56
BP1	April	73	56	103	27,9	22	38	73	56	103
	May	252	16	901	45	4	140	252	16	901

4.2 Summary of Monitoring Outcomes

90. The Contractor has hired Sustainable Development Solutions Caucasus (SDSC) LLC, a certified laboratory, to conduct regular monthly instrumental monitoring of the parameters for air and water quality and noise levels to control pollution levels. Testing has been carried out every month since August 2021.
91. Air quality assessments were conducted at multiple points within the project vicinity. There is one measurements at batching plant No: 1 surpassing the established national air quality limits in Georgia (150 micrograms/m³). Contributing factors to the heightened PM values include the regular operation of heavy machinery, material handling processes, and insufficient dust control measures.
92. In some locations, TSS levels are high during most of the measurement sessions. These can result from various factors including soil erosion due to extensive earthmoving and excavation, leading to the exposure of bare soil and subsequent runoff of eroded particles into the river, insufficient erosion control measures, Construction sites near riverbanks may destabilize the soil, causing increased erosion and contributing to higher TSS levels. Additionally, improper disposal of construction waste, including materials like concrete and gravel, near or in the river can further impact water quality. To ensure compliance with environmental regulations throughout the construction process, it is crucial to implement effective erosion control measures and follow best management practices as outlined in paragraphs 72 and 75.
93. Some locations, some residential and some non-residential, have higher vibration levels than the Georgian vibration standards established based on human comfort levels. However, the vibration levels stayed within German and British standards, which are used to avoid impacts on buildings. The Contractor should apply mitigation measures outlined in paragraph 84 to minimize vibration levels.
94. Overall, the measured noise levels (LAeq results) vary between 43.3 dB(A) to 72.2 dB(A), with the upper range of measurements high for the receiving environment. To minimize the noise levels the Contractor should apply the mitigation measures indicated in paragraph 79.

4.4 Waste Management

95. The Contractor developed a Waste Management plan to describe the requirements for establishing and conducting proper waste management and to address the handling, storage, and management of wastes to assure that works are conducted in a manner that minimizes environmental risk and is shared with the MoEPA in 2020. The Contractor received comments in January 2021 for the revision of the plan. After revision and resubmission of the plan dated April 23, 2021, it was approved dated May 7, 2021, by the MoEPA. The Contractor officially shared the plan with the Engineer on July 2, 2021.
96. The Contractor renewed the agreement with the “Zestafoni Cleaning and Improvement Service Center” of the Zestafoni Municipality regarding the provision of the collection and transportation of domestic wastes on February 2, 2023. The agreement is valid until February 1, 2025.
97. The Contractor has developed a waste log to record the movements of all non-hazardous and hazardous wastes. This register/log mainly includes;
- Type of waste,
 - The volume or mass of the waste,
 - Date of disposal,
 - Sub-Contractor’s name.
98. Detailed information regarding the type of waste disposed of and responsible licensed companies are given in Table 18.

Table 18: Waste Management (January – July 2024)

#	Domestic/Hazardous Waste & Sewage	Volume /kg/m3	Licensed Company	Transferred
1	Household waste	154 m3	NNLEP “Zestafoni Cleaning and Improvement Service Center” of the Zestafoni Municipality	154 m3
2	Sewage water	78 m3	By “Sanitary” LLC owned Vacuum trucks discharged into the Terjola municipality “Sewage Treatment Plant” (STP)	468 m3
3	Used tyres	60 pieces X 55 kg = 3,300 kg	Non-profit legal entity “Wasteless” -Extended Producers Responsibilities- (Used for heavy equipment road-crossing purposes)	0
4	Hydraulic and used oil	900 kg	Non-profit legal entity “Wasteless” -Extended Producers Responsibilities-or to Hazardous waste contractor “Sanitary” LLC	800 kg
5	Waste paints and varnishes	254 kg	Sanitary LLC Incinerator	254 kg
6	Chemical additive tanks	N/A	The chemical additive contractor is delivering by Truck Cisterns	N/A
7	Oil drums	42 pcs	Has been stored at GHEC HWTSA for reuse in liquefied hazardous waste proper storage or transportation to “Sanitary” LLC CWAA	42 pcs
8	Used food oil	N/A	“Sanitary” LLC	N/A
9	Printer tonner	N/A	“Sanitary” LLC	N/A
10	Absorbents (e.g., oil filters, polluted clothes and materials)	80 kg	“Sanitary” LLC Incinerator	0 kg
11	Medical Waste	3.2 kg	“Sanitary” LLC Incinerator	0 kg

12	Metal Scraps	92 m3	"Geosteel" LTD	0 m3
13	Wood Waste	18 m3	Given to Local Citizens	18 m3
14	Contaminated soil	1250 kg	"Sanitary" LLC Bio-remediation area	0 kg

99. The Contractor keeps records of waste transfer notes filled and signed by the Contractor, waste carrier, and receiving facility. During the reporting period, **154 m³** of domestic waste was transferred to be disposed of.

100. The Contractor constructed septic tanks in worker's camp no 2 and worker camp no 3 with a total capacity of 90 m³ and 7 m³ respectively. During the reporting period, the Contractor discharged **72 m³** of domestic wastewater through licensed vacuum trucks owned by "Sanitari LLC".

101. A total of 1,254 kg of hazardous waste has been safely transferred to the hazardous waste disposal area managed by Sanitary Ltd for incineration, with the intention of managing and treating the waste in an environmentally responsible manner.

4.5 Spoil Disposal

102. The main source that generates a large amount of the waste is earthworks, specifically: the excavation of the soil and rock soil material excavated from the tunnels. The estimated volume for spoil generation is given below:

- Estimated spoil generation: 2,502, 415 m³
- Estimated spoil reuse for embankments: 2,200,000 m³
- Spoil needs to be disposed of: 300,000 m³ (estimated spoil disposal into Spoil Disposal Area No 1: 120.000 m³, estimated spoil disposal into Spoil Disposal Area No 2: 250.000 m³, estimated spoil disposal into Spoil Disposal Area No 3: 30.000 m³)

103. Three spoil disposal areas were approved by the Ministry of Regional Development and Infrastructure of Georgia (MRDI) and the Roads Department of Georgia (RD). The first approved area is located at the administrative borders of Zestafoni Municipality, N45 Sergo Zakariadze Street (c/c: N32.10.41.096; 32.10.41 .262), right side of the existing E60 main Road KM 185+00 to KM 200+00 with a total area of 42,438 m². The second approved spoil area is located in the village Kveda Sakara (C/C N32.03.44.018) with a 10,900 m² total area. The Contractor started using a third spoil disposal area approved by the MRDI after the excavation work commenced at Tunnel 6 location. This area was initially proposed and utilized at the beginning of the Project but was discontinued a few months later, as it is located far away from the main excavation working areas.

4.6 Health and Safety

104. HSE Team is responsible implementation, supervision, and monitoring of the construction activities on-site on a daily basis to ensure occupational and community health and safety are maintained. The Contractor's HS specialists include the followings:

Jan Du: Head HSE officer

Mirza Bagashvil: Local HSE staff

Giorgi Karelidze; Local HSE officer

Lasha Peradze: Traffic Safety

Giorgi Kimeridze: Local HSE staff

105. Engineer's local H&S specialists, Mr. Zaal Giorgadze and Nerses Makarov have been continuously monitoring the Contractor's H&S performance in working areas. They have provided advice to the Contractor on how it mitigate risks. H&S specialist, Mr. Giorgadze, prepared and reported approximately 24 weekly (6 monthly) safety observation reports during the reporting period. Moreover, Mr. Zura Rukhadze joined the Engineer's team as Road Safety Specialist to ensure traffic safety during construction.

4.6.1 Community Health and Safety

106. No incident reported involving community members or no traffic incident was recorded during the reporting period.
107. The Contractor has appointed flagmen to control the movement of heavy vehicles on construction sites and the traffic while cars/heavy vehicles enter and exit the construction sites. All flagmen were trained about the HSE requirements of the Project.
108. The Contractor has appointed security officers on all construction site entrances and installed a CCTV camera control system in all camp areas and batching plants. Camp areas and batching plants are fenced along to provide isolation. DETECTORI (The Security Company) has installed CCTV Cameras, which are being watched and operated by the DETECTOR

4.6.2 Occupational Health and Safety

109. Regular safety inspection of the construction site is being conducted by H&S representatives as a continuous process. H&S specialist reports all safety deviations to HSE Manager daily. In addition, the H&S department conducts mandatory HSE induction for new employees and started to provide special safety training for workers to raise safety culture including working at height, flagmen training, driving safety, requirements for earthwork activities, and lifting operations. Moreover, the HS specialist prepares documentation for training, risk assessments for special works, and work procedures.
110. The Contractor is providing the mandatory PPEs and special protective equipment for the on-site workers. Nevertheless, more than enforcement of usage is required. Therefore, the Contractor purchased welder's aprons (30 no's) for welders and safety shoes and distributed them to workers.
111. Based on data provided by the HSE team, there were no major or minor accidents during the reporting period. The accidents reported during the reporting period are given in Table 19.
112. There are daily walkthroughs by the HSE inspectors from the Contractor and Engineer and bi-weekly/monthly HSE meetings.

Table 19: Types of Accidents Reported

Accident Type	Reporting Period (Jan – Jun 2024)	Total (Dec 2020 to Jun 2024)
Near Miss	0	0
Accident Minor	0	1
Accident Major	0	1

113. The Contractor assigned permanent medical personnel (doctor – Irma Porchkhidze and nurse – Nino Okroshidze) to provide medical assistance in a medical emergency, including the safe evacuation of the injured person. The doctor started working at the beginning of 2022.

4.7 Training

114. The Contractor continues the training program to form a lasting culture on the behavior and activities of employees, affecting the environmental, social, and safety performances. The program covers both mandatory induction training and work-specific training.
115. During the reporting period, given training covered the following topics:
- Induction training,
 - Tree cutting,
 - Tops soil stripping and storage,
 - Hazardous non-hazardous waste handling storage,
 - Refueling process,

- Environmental and social training,
- Earthwork activities,
- Driving safety,
- Lifting operations,
- Working at height,
- Flagmen training,
- Toolbox talks,
- Refresh the Concrete Mixer truck drivers training cisterns to wash out procedure and Usage of the separators,
- Refueling Process, and
- Blasting activities.

116. The Contractor conducted general Environmental and Social training on environmental issues for 47 persons of the Contractor's staff. The training covered basic knowledge related to environmental legislation, topsoil preservation, air quality, waste management, land contamination, spill prevention, biodiversity, noise, resources management, chemical management, community safety, cultural heritage, and code of conduct. Sample attendance lists/sheets are enclosed in Annex 4.

117. During reporting period 2016 toolbox talks were provided by the HS&Environment officers, foremen, or site supervisors.

4.8 Social Management and Grievance Redress Mechanism

118. Grievance Redress Mechanism (GRM) was developed by the Contractor and submitted to Engineer for reviewing and approval (February 19, 2021- Ref: 20210403-0148-GHEC-UBM, April 3, 2021- Ref: 20210316-0134-GHEC-UBM and April 16, 2021-Ref: 20210416-0166-GHEC-UBM). GRM was approved in April 2021.

119. Sixteen (16) grievances were received either directly from the local community or through the Employer during the reporting period. Of the total twentyone received grievances, eleven related to Damaged structure / Assets, and five complaints logged were pertinent to Restriction or Loss of Access as given in Table 20. Of 16 grievances none have been resolved and all of them are in the pending situation.

Table 20: Status of Grievances

S#	Nature of Grievances	No. of total Grievances	Results		
			Open	Close	Tech. Hold
1	Damage to Infrastructure/Assets	11	11	-	-
2	Inclusion in LARP	-	-	-	-
3	Restriction or loss of access	5	5	-	-
4	Compensation Rate	-	-	-	-
5	HSE Concerns	-	-	-	-
6	Disturbance: Noise / Vibration / Dust	-	-	-	-
Total		16	16	-	-

120. The Contractor implements community meetings and regular visits to the site. The details of these communication with stakeholders are given in the Social Safeguard Monitoring Report (January – June 2024).

5. FUNCTIONING OF SSEMP

5.1 SSEMP Review

121. To ensure that all potential mitigation measures are applied during the construction phase, the Contractor shall be responsible for preparing his Specific Environmental Management Plans (SEMP) during the pre-construction phase. The approved SEMPs include the following plans:

(i) Topic Specific Plans:

- Waste Management Plan
- Spoil Disposal Plan for Arrangement of Spoil Disposal Area
- Re-cultivation Plan
- Traffic Management Plan
- Occupational Health and Safety Plan
- Community Health and Safety Plan
- Emergency Preparedness and Response Plan
- Air Quality Plan
- Spill Response Plan
- Vibration Monitoring Plan
- Clearance, Re-vegetation, and Restoration Management Plan
- Groundwater Management Plan
- Tunnel Blasting Plan
- Noise Management Plan
- Biodiversity Action Plan
- Topsoil Stripping and Storage Plan
- Chance Find Procedure
- Grievance Redress Mechanism
- H&S and E&S Training Plan
- Bridge Construction Plan
- Community Liaison Management Plan

(ii) Site Specific Plans:

- Construction Camp Management Plan
- Asphalt Plant Plan
- Rock Crushing Plant Plan
- Concrete Batching Plant Plan.
- Site-Specific Method Statement for Working in the Area above the
- Railway Line at KM 6.3 and at Bridge BR 4.0.1. AT/TA
- Detailed Method of Working in the Water and Workplan
- Contaminated Spoil Treatment Plan

122. In Annex 5, the Clearance, Re-vegetation, and Restoration Management Plan, as well as the Re-cultivation Plan were given. These plans outline the areas to be reinstated and provide detailed information about the reinstatement process. The engineer requested an updated version of the plan, including the total amount of cut trees (both for redlist and non-redlist), the latest status of sapling preparation, and the areas designated for revegetation.

123. SEMP was developed by the Contractor and submitted to the Engineer for reviewing and approval (January 27, 2021-Ref:20210127-0090-GHEC-UBM, February 19, 2021- Ref:20210219-00108-GHEC-UBM, March 2, 2021-Ref:20210302-0118-GHEC-UBM March 15, 2021-Ref: 20210315-0129-GHEC-UBM and May 28, 2021- Ref 20210528-0148). SEMP was approved on June 7, 2021, with Engineer's letter no 0333-CSAE60-F4-UBM-GE.

6. GOOD PRACTICES

6.1 Good Practices

124. Following best practices are being adopted by the Contractor due to site inspections, issuance of inspection reports, and discussions during construction progress meetings headed by the Engineer:

- The Contractor has implemented a series of measures to enhance dust suppression at the construction site, including installing advanced dust control systems and regularly spraying water on high-traffic areas. These measures have been effective in significantly reducing airborne dust particles and improving air quality around the site.
- The Contractor has introduced a series of measures to improve waste collection at the construction site, including increasing the frequency of waste removal and placing additional

waste bins throughout the site. These measures have been effective in maintaining a cleaner work environment and reducing the risk of waste-related hazards.

7. SUMMARY AND RECOMMENDATION

7.1 Summary

125. The Engineer observed a sum of 96 Environmental and 415 Health and Safety issues during site visits and inspections. Out of 96 Environmental issues (and additional 16 issues from the previous reporting period), 101 issues were closed, and there are 11 issues remaining for the next semi-annual report to follow up. Similarly, out of 415 H&S issues (and additional 46 issues from the previous reporting period), 421 issues were closed, and there are 40 corrective action requirements for the next semi-annual report to follow up.
126. The Contractor has hired a certified laboratory (given in Annex 3), Sustainable Development Solutions Caucasus (SDSC) LLC, and carried out instrumental monitoring, including noise, vibration, air quality, and surface water quality measurements, during the reporting period.
127. The environmental monitoring results show no significant variance from previous monitoring periods. TSS values are essential parameters for surface water quality.
128. Noise and vibration levels are sometimes higher than local and international regulations allow. The Contractor could arrange working schedules at these locations to reduce the levels.
129. One measured PM level exceed the national air quality limits in Georgia (150 micrograms/m³) at the batching plant No: 1 measurement point. The Contractor could implement effective dust control measures, including regular watering and maintenance of heavy machinery.

7.2 Recommendations & Follow-up Actions for the next Monitoring Period

130. The following recommendations describe any actions required to achieve full compliance with each requirement in the EIA, EMP, and conditions of the contract during the 2nd half of 2024 (H2 2024):
- The main environmental issues to be improved are listed below;
 - **Sewage Management Improvement:** The Contractor should actively implement improved sewage management practices to prevent direct sewage discharge into the environment. This involves upgrading existing systems to reduce the amount of sewage released into the environment, thereby enhancing water quality and lowering the risk of disease.
 - **Watering During Dry Season:** The Contractor should boost the frequency of watering when necessary, especially during the dry season, to reduce dust generation. This proactive approach can significantly mitigate the impact on air quality and local communities.
 - **Sanitary Facilities Improvement:** The conditions of sanitary facilities in various camps require improvement. The Contractor should take proactive measures to guarantee the proper maintenance, sufficient equipment, and regular stocking of essentials like soap, toilet paper, and paper towels.
 - **Proper Handling of Hazardous Material:** The Contractor should guarantee the proper storage of hazardous materials under suitable conditions, keeping them away from water courses to prevent accidental spills or pollution incidents.
 - **River Protection Measures:** To safeguard the river ecosystem, the contractor must implement stringent measures at spoil disposal sites. These measures are crucial to prevent any contamination or disruption caused by pollutants like sediment, chemicals, or debris reaching the river. Maintaining high environmental standards at these sites is critical for the contractor to ensure the river's continued health and biodiversity.

- **Riverbed and Riverbank Restoration:** The Contractor must also prioritize the riverbed and riverbank restoration process. This involves repairing any damage caused during construction and actively maintaining the natural habitat. These efforts are essential for the river's long-term health and the sustainability of its ecosystem. Restoration activities for the contractor may include stabilizing the riverbanks to prevent erosion, and removing any debris or pollutants that have entered the river.
- **Temporary Storage of Spoil Materials:** The Contractor must manage the temporary storage of spoil materials in different areas according to Georgian legislation. By implementing proper management practices, the contractor ensures that temporary storage doesn't lead to long-term environmental degradation.
- **Drainage Management at Spoil Disposal Site:** The Contractor must effectively address drainage problems at Spoil Disposal Site No: 3. This will prevent waterlogging and potential contamination of surrounding areas, protecting both the environment and the health of nearby communities. Solutions may include installing proper drainage systems, constructing retention ponds, and ensuring water is directed away from sensitive areas.
- **Height Control of Spoil Disposal:** The Contractor must carefully control the height of spoils at Spoil Disposal Site No: 1. This ensures the site remains safe, avoids excessive land use, and minimizes visual impact on the surrounding area. Techniques like terracing and compaction can help manage spoil height, while the final shaping should be guided by aesthetic considerations to blend with the natural landscape.
- **Batching Plant Wastewater Management:** The Contractor must prioritize the proper management of batching plant wastewater. This will prevent pollution and protect the area's water quality. To maintain environmental standards and public health, the Contractor should implement effective wastewater treatment and disposal practices. This may involve increasing the frequency of sediment trap changes and constructing larger settling ponds.
- There are several H&S issues to improve, such as
 - Poor housekeeping,
 - Improper material storage,
 - Electrical safety,
 - Damaged lifting equipment,
 - Damaged tools and equipment,
 - Unsafe working at height,
 - PPE usage,
 - Dangerous and hand-made equipment,
 - Poor Access road conditions,
 - Deep excavation without guard rails and
 - Driving safety

ANNEXES

Annex 1: Project Photo log during Monitoring Period

	
Poor Waste Management (Worker’s Camp No 2, February 2024)	Poor Management of Discharge Water (Batching Plant No: 1 February 2024)

	
Leaking Sewage Tank (Worker's Camp No 6, February 2024)	Poor Housekeeping (Worker's Camp No 6, February 2024)

	
Partial Demolition of the Worker's Camp No:4 (February 2024)	Poor Waste Management (Worker's Camp No:4, February 2024)

	
Panoramic View of Spoil Disposal Area No:1 (Height Issue, February 2024)	
	
Worker's Camp No: 5 Demantling&Reinstatment (February 2024)	
Leaking Sewage Tank (Worker's Camp No 2, August 2023)	Poor Dust Management (Tunnel 6 Excavation Area, Augst 2023)



Poor Waste Management (Tunnel 4&5 Portal, February 2024)



Temporary Spoil Storage (Near Tunnel Portal 5 - Argveta Site, May 2024)



Drainage Issue for Spoil Disposal Site No: 3 (Panoramic View, May 2024)



Spoil Disposal Site No: 2 (Panoramic View, May 2024)

	
Hazardous Waste Storage Area (May 2024)	Riverbed and Embankment Reinstatement Issue (Bridge No: 1, May 2024)

Annex 2: Latest HS&E Inspection Report (June 2024)



Site Inspection Report

Project:	Construction of “Shorapani-Argveta” Section (E60 Highway Route) Lot F4
Subject:	On Site Inspection
Inspection Date:	From 24 th to 30 of June, 2024
Issue Date:	01 st of July, 2024
Occupational Health & Safety Specialists:	Nerses Makarov – Zaza Giorgadze

Detailed Description of Activities

On the week, from 24th to 30 of June 2024, work processes have been inspected on SHORAPANI-ARGVETA Section F4 by UBM Health and safety representatives. Inspections were done during day and night shift. Site inspections revealed safety violations and good observations. Health and safety related issues were discussed with Contractor's H&S team. Agreement reached to continue work hard on improvement of H&S related issues during the work process to ensure that the site is a safe working environment for the workers, involved in the tasks at workplaces. Also, corrective actions were taken against violations which have been revealed in the previous inspection reports.

Below are the list of the violations and good observations revealed during on-site inspection. Some issues related to Company H&S rules and requirement were solved immediately and some must be corrected in the following week.

Supporting Photos with Descriptions.

Possible damage of equipment and personnel injury

Electric distribution boards (Panels):

Damaged, not properly locked, with limited access, not labeled and thrown on the ground electric distribution boxes, electric supplied devices and extension cables have been observed.



Workshop (Bridge N1)

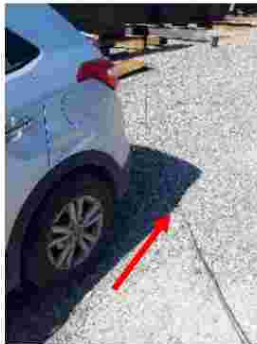


Tunnel N1 AT-A



Bridge N2 TA-T

Site Inspection Report



Bridge №2 TA (Workshop).



Tunnel №1 AT-A



Before



After

Bridge N1 TA – *Damaged in many places the extension cable has been observed during site inspection. After verbal warning given to the Contractor, all damaged places have been repaired.*

Damaged in many places, not properly repaired, pressed between the rocks and left unattended in the water the extension cables have been observed left unattended on the floor. Careless use or the accidental touch may cause the possible incident and somebody from the working personnel may get electrocuted. All electric cables must be released from the water, be replaced by the new one or repaired, elevated and hung on to the safe height in order to avoid the possible incident at the workplace.

Site Inspection Report

Picture 1: Negative observations – (Electric safety - Possible injuries of working personnel) (Tunnels, bridges, Interchanges and nearby workshops) - The violations to electrical safety rules and requirements are continuing, because the Engineers are still facing electric safety related non-compliances at workplaces. Some electric panels and distribution boards are in good condition, properly locked and labeled, but some of them are in bad condition (Not properly locked, partially damaged, not labeled and thrown on the floor). Also, the high voltage “life” electric cables have been observed left unattended on the floor. All these non-compliances may cause possible incidents, possible property damage and injury of the working personnel. The Engineers are continuously informing the site responsible persons from the Contractor Company about these issues and asking to solve this problem as soon as possible. The Contractor is trying to close all these non-compliances, but it isn't enough for full completion of mentioned above problems. The Contractor has to replace or repair all damaged or not properly locked electric panels on the new one, keep an eye and continue monitoring of electrical safety related issues at the workplace, do site inspections very often to reduce and finally eliminate all possibilities of having electric safety related incidents at workplaces. The Engineer is still waiting for feedback from the Contractor. **Some electric related non-compliances are still open.**



Interchange N1 (Workshop)



Workshop (Bridge N2)

- Correctly stored the oxygen cylinders has been observed during site inspection. The storage cage was properly locked and labeled.

Picture 2: Positive observations – (Incorrect use and improper storage of tools and equipment - Property damage) – The violation to workplace safety related H&S requirement that had been observed by the Engineer in the previous weeks is still actual. Properly stored the oxygen cylinders have been observed during site inspection, but the Engineers are still facing the oxygen cylinders and propane bottles that are left inattentively at workplaces. Incorrect or accidental contact with the cylinders may cause the possible property damage and injury of working personnel. The site responsible persons from the Contractor Company were informed about it by the Engineer several time. The Engineer has asked to remove all oxygen cylinders/propane bottles that aren't in use, away from the workplaces and send it to the storage area. Also, the Engineer has asked Contractor to place all using cylinders in the trolley and replace all damaged gauges on the new one. The Engineer is waiting for feedback from the Contractor. **Non-compliance is still open.**

Site Inspection Report

Positive observations:



Bridge N2 (Workshop) – *It has been observed that the crew was using correct and good quality lifting equipment.*

Negative observations:



Tunnel N1 AT (Argveta side)

Main road (Bridge N1 AT-Tbilisi side)

Site Inspection Report



Picture 3: Positive and Negative observation – Lifting safety (All tunnel and bridges) – Good and bad (Including handmade) quality lifting equipment has been observed during site inspection. The Engineer has asked the Contractor's site responsible persons to take care of this issue and pay additional attention at to avoid the possible incidents and injury of working personnel. Issue isn't solved yet.

Negative observations:



Site Inspection Report

Bridge N1 TA – The workers in an unsafe position have been observed during site inspection. They didn't wear the fall arrest equipment while performing the task at the elevated height. Proper PPE must be worn to avoid the possible fall and personal injury.



Tunnel portal N3 AT (Argveta side) - The workers in an unsafe position have been observed during site inspection. They didn't wear the fall arrest equipment while performing the task at height. It is strictly forbidden to stay on the basket when working. It could cause the possible fall and personal injury. It has also been observed that no handrails were installed around to protect the workers from the possible falls. The Contractor has to pay additional attention to this issue in order to avoid the incidents at the workplace.



Before



After

Tunnel N1 AT - The worker didn't wear the fall arrest equipment (safety body harnesses) when working at the elevated height. After a verbal warning given to him, he weard the safety body harness and returned back to the work.

Site Inspection Report



Workshop (Bridge N2-Tbilisi side) – The workers in an unsafe position have been observed during site inspection. They didn't wear the fall arrest equipment while performing the task at the elevated height. One wrong step may cause the possible fall and personal injury. After a verbal warning given to the workers, they have wear the safety body harnesses and returned back to the work.



Site Inspection Report

Drilling of piles (Tunnel N1 AT-A) – The workers (With no proper PPE) were standing on top of the drilling machine and bucket of the loader to perform (To pull the hoses into the drilled hole) the task at the elevated height. It is strictly forbidden to use the Construction machinery as a platform to perform the task at height. One wrong step may cause the possible fall and personal injury. Proper tools and equipment must be used to ensure the work process safety.

Positive observation:



Bridge N2 AT – Safe work process has been observed during site inspection. The worker was equipped with the proper PPE (Fall arrest equipment) while performing the task at the elevated height.

Picture 4: Negative and positive observations – Working at height Safety - (Bridges) – The persons in safe and an unsafe position have been observed during site inspection. It is forbidden to perform the task at height without proper PPE, because it may cause the possible incident, fall and injury of the working personnel. Correct PPE, technique and equipment must be used to avoid the incident and personal injury. Non-compliance isn't solved.



Site Inspection Report

Picture 5: Negative observation – Tools and equipment - (Bridge N2 TA and AT) – Despite several warnings, given to the Contractor regarding use of handmade steel structures (with no proper access, no handrails and guardrails), the Contractor still continue violation to the H&S regulation and continue using these structures to perform the work at the elevated height. Correct tools and equipment must be used in order to avoid the possible incident and personal injury at the workplace. All tools and equipment must be in good (Factory-made or should meet the standards) working condition in order to avoid the possible incident and personal injury. **Non-compliance isn't solved yet.**



Picture 6: Non-compliance – Tools and equipment – (Tunnel portal N1 AT-A) – It has been observed that the pieces of rocks were accumulated on the top of the tunnel portal. Even a small vibration or physical contact may cause the possible roll down and somebody from the working personnel performing the task near the tunnel may get injured there. All rocks must be removed immediately to avoid the possible incident at the work place. **Non-compliance isn't solved yet.**

Negative observation:



Bridge N1 TA

Tunnel N1 TA -A

Site Inspection Report

The workers aren't equipped with proper PPE (Safety helmet, safety shoes, reflective jackets, welding face shield, leather jacket and handgloves) when performing the task.

Positive observation:



Workshop (Bridge №2)



Tunnel portal N3AT-A

The workers are equipped with the proper PPE when performing the task.

Picture 7: Negative and Positive observations – PPE (Tunnels and Bridges) – Violation of safety rules and requirements have been observed. It has been observed that the workers weren't equipped with proper PPE when performing the task. The Contractor has to pay attention to this issue in order to avoid the possible incident at the workplace and injury of the working personnel. Non-compliance isn't solved.

Positive observation:



Before



After

Site Inspection Report

Access to the Tunnel N2 TA-A – After a verbal warning given to the Contractor, the safety flash cones have been placed all along the access road. It isn't enough to close the issue, the hard barriers and warning signs must be installed to ensure that the access to the workplace is safe.



Before



After

Main road (E60) (Near the Tunnel N1 TA-Tbilisi side) – After a verbal warning, given to the Contractor, the jersey barriers have been placed.

Negative observation:



Access to the Tunnel N1 AT-T – No hard barriers and no warning signs are installed all along the slope to protect the workers from possible fall.

Picture 8: Non-compliance – Workplace safety – (Bridges and Tunnels) – It has been observed that the edges of slopes and edges of main road aren't well protected from the possible fall or rolling down the hill. The hard barriers and warning signs must be installed near the edge (All along) of the slope and main road in order to warn the drivers or pedestrians about the possible fall or rolling down the slope hazards. Non-compliance isn't solved.



Picture 9: Non-compliance – Driving safety (Access to the Tunnel N2 TA) – It has been observed that the worker was sitting on the trunk of the truck while it was moving. It is strictly forbidden to sit on the truck when it is moving, because the one wrong step or the wrong maneuver of the truck may cause the possible fall and personal injury. All necessary safety precautions must be taken by the Contractor to avoid the possible incident and injury of the working personnel. Non-compliance isn't solved yet.

Site Inspection Report



Tunnel N 1 (Argveta side)

Workshop (Bridge N1)

Picture 10: Non-compliance – Workplace safety – (Tunnels and Bridges) – Use of handmade ladders and working platforms at the workplace have been observed during site inspection. Use of such equipment may cause the possible fall and personal injury. Correct type (Factory-made) working equipment must be used in order to avoid the possible incident and injury of the working personnel. **Non-compliance isn't solved.**



Picture 11: Negative Observation – (Tunnel №3 ATA) – **No positive changes have been made by the Contractor in this regard seems last weeks.** No fire extinguisher has been placed near the working Generator. Careless use or possible spark may cause the incident and possible fire. A few fire extinguishers must be placed near the working Generator to localize the fire in time if such incident will take a place. **Non-compliance isn't solved yet.**

Site Inspection Report



Picture 12: Negative Observation – Driving safety (Main road (E60)) – Additional attention to the Company trucks must be paid from the Contractor's side, because the use of damaged and not properly repaired trucks may cause the traffic related accident and possible personal injury of the drivers and pedestrians as well. One of the examples has been given in the pictures attached below. The tire became loose on the truck while it was moving. Nobody got injured and it didn't cause the traffic accident as well. The Contractor has to pay additional attention to this issue in order to avoid the possible incident and injury of the working personnel. **Non-compliance isn't solved.**



Picture 13: Positive Observation – Lifting safety (Main road (E60)) – Safe lifting process has been observed during site inspection. It has been observed that the working area was protected by using traffic flash cones and plus, the flagmen were appointed to control the movement of the vehicles crossing the workplace.

REMARK: No NCR's have been written during this week.

Annex 3: Latest Water, Ambient Air Quality, Noise, and Vibration Monitoring Reports (May & June 2024)



ENVIRONMENTAL MONITORING REPORT
WATER, AMBIENT AIR QUALITY, NOISE AND VIBRATION
MONITORING

F4, SECTION OF E60 HIGHWAY

PREPARED BY

SDSC LLC

DIRECTOR: GIORGI GULIASHVILI

A handwritten signature in blue ink, appearing to read "Giorgi Guliashvili", is placed over the printed name.



May, 2024

Contents

1. Introduction	3
1.1. <i>Project description</i>	3
1.2. <i>Purpose of the monitoring</i>	3
2. Monitoring locations	4
2.1. <i>Water Monitoring Locations</i>	4
2.2. <i>Noise, Dust and Vibration monitoring locations</i>	4
3. Monitoring parameters and methodologies	5
3.1. <i>Surface Water monitoring methodology</i>	5
4. Laboratories	8
5. Sampling activities	8
5.1. <i>Surface Water Monitoring field activities</i>	8
5.2. <i>Noise and dust monitoring field activities</i>	9
6. Analytical results and conclusions	9
6.1. <i>Surface water monitoring</i>	9

List of Tables

Table 2-1 Surface water monitoring locations	4
Table 2-2 Noise and Vibration monitoring locations	5
Table 3-1 Surface water monitoring parameters	5
Table 6-2 Bridge N3 (Borimela River) up and down stream monitoring results	9
Table 6-3 The results of dust monitoring at Batch Plant #1 ($\mu\text{g}/\text{m}^3$)	10
Table 6-4 The results of dust monitoring at Batch Plant #3 ($\mu\text{g}/\text{m}^3$)	10
Table 6-7 Noise measurement results	10

List of Figures

Figure 1-1 Road Location Map	3
Figure 2-1 Surface water monitoring locations	4
Figure 2-2 Noise and Dust monitoring locations	5
Figure 3-3 Noise monitoring equipment	6
Figure 3-1 Dust Monitoring equipment	7
Figure 3-2 Zero calibrator	7
Figure 5-3 Bridge N3 upstream (Borimela River)	8
Figure 5-4 Bridge N3 downstream (Borimela River)	9

Attachments

Attachment 1 – Air, noise and vibration monitoring report

Attachment 2 - Water tests laboratory reports

1. Introduction

1.1. Project description

The Government of Georgia is endeavoring to make Georgia a regional and logistics hub and more attractive for businesses. The East West Highway (EWH), stretching 410 km from Sarpi on the Black Sea, at the border with Turkey, through the center of the country to the capital Tbilisi and on to the border with Azerbaijan, is the main inter-regional and international route between western and eastern Georgia, as well as its neighboring.

In light of the traffic growth on EWH, the high percentage of truck traffic, and the difficult terrain and resulting geometric profiles, capacity expansion of the current 2-lane mountainous section between Chumateleti and Argveta is crucial to realizing full potential of the EWH with improvements to the highway either completed or underway on each side of this section.

Therefore, the Government has requested the Asian Development Bank (ADB) and several other development partners to finance the remaining bottleneck sections (Chumateleti - Argveta) on the EWH.

The Project involves construction of a new road section of the E-60 highway located in Imereti Region of central Georgia (see Figure 1-1). Section F4 forms the Shorapani – 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)
- n) - 14.726 km.

Figure 1-1 Road Location Map



1.2. Purpose of the monitoring

As per contract LTD SDSC was requested to conduct regular surface water, Noise and Vibration monitoring along the F4 section of highway construction.

The purpose of the monitoring was to collect monitoring data of surface water, Air quality, Dust, Noise and Vibration and compare with baseline monitoring results as well as with project specified standards based on EIA.

2. Monitoring locations

2.1. Water Monitoring Locations

Water monitoring locations proposed by the client are reflected in Table 2-1, and in Figures 2-1. Bridge N3 up and down stream monitoring location also covers the Batching plant 1 monitoring locations.

Table 2-1 Surface water monitoring locations

Monitoring Locations	Coordinates	Monitoring Date
River Borimela (bridge N3) up and downstream	342153.91 4661762.47	25/04/24

Figure 2-1 Surface water monitoring locations



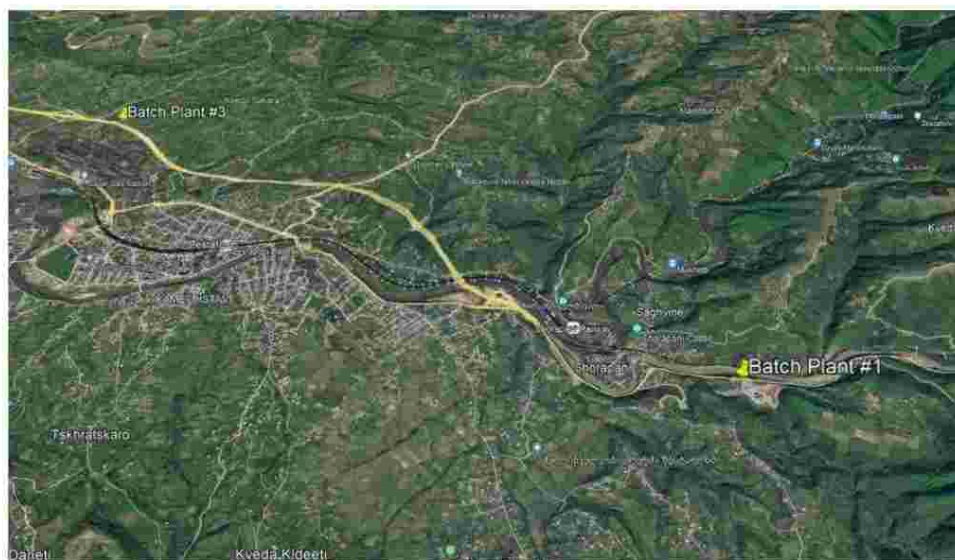
2.2. Noise, Dust and Vibration monitoring locations

Noise Dust and vibration measurements were performed on 2 monitoring points along F4 section of the E-60 highway in the month of June. GPS Coordinates of monitoring points are shown in the Table 2-2 and general overview on satellite map (Figure 2-2).

Table 2-2 Noise and Vibration monitoring locations

#	Point	X	Y	Conducted work/measurement
1	Batch Plant #1	342365	4661850	Noise, dust
2	Batch Plant #3	336335	4665760	Noise, dust

Figure 2-2 Noise and Dust monitoring locations



3. Monitoring parameters and methodologies

3.1. Surface Water monitoring methodology

Monitoring parameters for surface water monitoring were provided by Client based on EIA requirements. List of parameters to be monitored and test methods are reflected in Table 3-1. National Maximum Allowable Concentrations (MAC) in surface waters have been used as a reference.

Table 3-1 Surface water monitoring parameters

Chemical Parameters	Measuring Unit	Test Method	National MAC
pH	-	SST ISO 10523:2010	6.5-8.5
BOD ₅	mg/l O ₂	SST ISO 5815-2:2003/2020	6
COD	mg/l O ₂	SST ISO 6060:2010	30
TSS	mg/l	SST ISO 11923: 2007	Increase by no more than 0.75
Total N	mg/l	GD 52.24.364-95	N/A
Total P	mg/l	SST ISO 6878:2004/2020	2

Nitrates (NO ₃)	mg/l	SST ISO 7890-3 : 2008	40
phosphates (PO ₄)	mg/l	SST ISO 6878:2004/2020	3.5
Oil & Grease	mg/l	EPA 413.1	0.3
Microbiological Parameters			
Total coliforms	MPN in 100 ml	SST ISO 9308 -1:2014/2014	400

The water samples are taken by the certified monitoring technicians, which are specially trained for the water sampling activities. The analysis of the water samples was conducted in the accredited DG Consulting Laboratory with ISO 17025 standard and if necessary, samples are sent to SYN LAB (Germany).

3.2. Noise Monitoring Methodology and Equipment

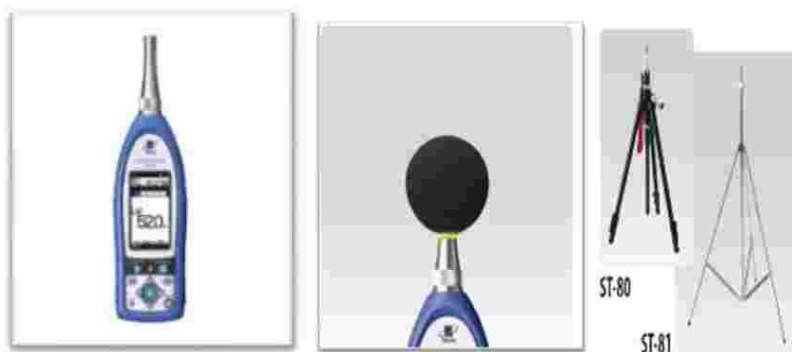
The noise level measurements were implemented in accordance with the British Standard BS 7445-2:2003 'Description and measurement of environmental noise'. The dust concentration measurements in the ambient air were conducted in accordance to the EU standards.

The monitoring points were selected, so as to represent the impact of the construction on local population as realistically as possible.

According to the above-mentioned standard, the following equipment was used during the noise level measurement activities:

- Rion NL-52, First class noise measurement device;
- Windscreen, WS-16;
- Tripod;
- SD Card;

Figure 3-1 Noise monitoring equipment



Noise measurement range: 0-133 dB

Noise measurements were done for one 30-minute session for each monitoring points.

3.3. Dust monitoring Methodology and equipment

Dust monitoring was conducted according to the EU standards. The equipment, which was used during the measurement are Dust Trak DRX Desktop aerosol monitor, which is installed in the Environmental Enclosure 8535, which allows the aerosol to measure dust concentration in ambient air in the field conditions.

Before starting the measurements, Zero Calibration was done to the aerosol, which calibrates the device to zero level in order, not to get correct results

The photos below show the used equipment for Dust monitoring and Zero Calibrator.

Figure 3-2 Dust Monitoring equipment



Figure 3-3 Zero calibrator



4. Laboratories

Water and air quality samples taken during field activities were sent to DG consulting laboratory (Georgia) and SYN LAB (Germany) for analyses. Samples were analyzed in accordance analytical suites and test methods proposed in chapter

5. Sampling activities

5.1. Surface Water Monitoring field activities

Sampling activities were undertaken on 24/05/24. The field team included Lasha Bibichadze and Giorgi Guliashvili. As per initial request from the Client, monitoring plan was included 1 bridge construction sites up and down stream monitoring.

All of the proposed sampling points were sampled successfully during the field visit.

Figure 5-1 Bridge N3 upstream (Borimela River)



Figure 5-2 Bridge N3 downstream (Borimela River)



5.2. Noise and dust monitoring field activities

Within the project, monitoring works were carried out at 2 points for one day.

Field activities (measurements, samples collection) were performed by DG Consulting team.

Monitoring activities were conducted on 22/05/24. The weather was cloudy, without wind, the average temperature varied between 23-25 OC..

Detail description and pictures of field activities are presented in **Attachment 1** of this report.

6. Analytical results and conclusions

6.1. Surface water monitoring

The results of surface water monitoring are indicated in the tables below:

Table 6-1 Bridge N3 (Borimela River) up and down stream monitoring results

Parameters	EIA Standards (National MAC)	Baseline results (June 2021)	Upstream	Downstream
pH	6.5-8.5	8.16	8.12	8.16
BOD	6mg/l	<3	<3	<3
COD	30mg/l	32	12	9
TSS	Increase no more than 0.75mg/l	20	12	19
Total N	N/A	1.5	0.6	0.8
Total P	2mg/l	0.15	0.06	0.08
Nitrates	40mg/l	4	<1	<1
Phosphates	3.5mg/l	0.45	0.18	0.24
Oil and Grease	0.3mg/l	<0.1	<0.3	<0.3

Total Coliforms	400MPN	ND	2500	2000
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Increased concentration of the TSS at the down stream sampling location is the result of the concrete batching plant operation which is located between up and down stream monitoring points.

6.2. Dust monitoring results

Trotec PC220 was used to monitor the dust concentrations in the ambient air. The device is specifically designed to perform dust monitoring and has own calibrator device, auto zero adjustment and all tools required by the standard document to undertake the measurement.

Dust concentration in the air was measured at 2 point.

The results of the measurements carried out are presented below in both tables and graphs:

Table 6-2 The results of dust monitoring at Batch Plant #1 ($\mu\text{g}/\text{m}^3$)

PM ₁₀			PM _{2.5}		
average value	min	max	average value	min	max
252	16	901	45	4	140
PM _{total}					
average value		min	max		
252		16	901		

Table 6-3 The results of dust monitoring at Batch Plant #3 ($\mu\text{g}/\text{m}^3$)

PM ₁₀			PM _{2.5}		
average value	min	max	average value	min	max
13	4	56	4	2	6
PM _{total}					
average value		min	max		
13		4	56		

According to the results recorded by instrumental measurement, the concentration of dust particles in the air is high in the vicinity of Batch plant #1. In addition to the project activities, the concentration of dust in the air is influenced by the highway in the vicinity of the facility, which is loaded with heavy traffic.

6.3. Noise Monitoring Results

Noise monitoring works were carried out at all 4 points, according to the client's request.

The obtained results are presented below in the form of graphs and table.

Table 6-4 Noise measurement results

Value	Batch Plant #1	Batch Plant #3
LAeq	62.5	57.6
LAmx	81.8	79.6
LAmin	46.2	40.7
L10	68.3	60.6
L90	54.1	48.5

According to the legislation of Georgia¹ and project and standards established for the project², the permissible noise level (LAeq) for areas which directly borders the residential houses, is 55 dB. From the results in the table, it can be seen that the permissible limit was exceeded (2.7 db) at the Batch Plant #3. The exceedance was caused by the heavy traffic on the highway.

Due to the fact that at the Batch Plant #1, the actual sensitive receptors are the workers working on the site, the recorded average noise value (LAeq) should be compared with the standard defined by the legislation of Georgia, which establishes the maximum permissible noise limits in the working environment for different categories of labor activity severity and tension.

Noise measurement graphs are given in *Attachment 1*:



ENVIRONMENTAL MONITORING REPORT
WATER, AMBIENT AIR QUALITY, NOISE AND VIBRATION
MONITORING

F4, SECTION OF E60 HIGHWAY

PREPARED BY

SDSC LLC

DIRECTOR: GIORGI GULIASHVILI

A handwritten signature in blue ink, appearing to read "Giorgi Guliashvili", is placed over the printed name.



June, 2024

Table of Contents

1. INTRODUCTION	3
1.1. PROJECT DESCRIPTION	3
1.2. PURPOSE OF THE MONITORING	3
2. MONITORING LOCATIONS.....	4
2.1. WATER MONITORING LOCATIONS	4
3. MONITORING PARAMETERS AND METHODOLOGIES.....	5
3.1. SURFACE WATER MONITORING METHODOLOGY	5
4. LABORATORIES.....	5
5. SAMPLING ACTIVITIES.....	5
5.1. SURFACE WATER MONITORING FIELD ACTIVITIES	5
6. ANALYTICAL RESULTS AND CONCLUSIONS	7
6.1. SURFACE WATER MONITORING	7

List of Tables

Table 2-1 Surface water monitoring locations.....	4
Table 3-1 Surface water monitoring parameters.....	5
Table 6-2 Bridge N3 (Borimela River) up and down stream monitoring results.....	7

List of Figures

Figure 1-1 Road Location Map	3
Figure 2-1 Surface water monitoring locations.....	4
Figure 5-3 Bridge N3 upstream (Borimela River)	6
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Attachments

Attachment 1 - Water tests laboratory reports

1. Introduction

1.1. Project description

The Government of Georgia is endeavoring to make Georgia a regional and logistics hub and more attractive for businesses. The East West Highway (EWH), stretching 410 km from Sarpi on the Black Sea, at the border with Turkey, through the center of the country to the capital Tbilisi and on to the border with Azerbaijan, is the main inter-regional and international route between western and eastern Georgia, as well as its neighboring.

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

Figure 1-1 Road Location Map



1.2. Purpose of the monitoring

As per contract LTD SDSC was requested to conduct regular surface water, Noise and Vibration monitoring along the F4 section of highway construction.

The purpose of the monitoring was to collect monitoring data of surface water, Air quality, Dust, Noise and Vibration and compare with baseline monitoring results as well as with project specified standards based on EIA.

2. Monitoring locations

2.1. Water Monitoring Locations

Water monitoring locations proposed by the client are reflected in Table 2-1, and in Figures 2-1. Bridge N3 up and down stream monitoring location also covers the Batching plant 1 monitoring locations.

Table 2-1 Surface water monitoring locations

Monitoring Locations	Coordinates	Monitoring Date
River Borimela (bridge N3) up and downstream	342153.91 4661762.47	14/06/24

Figure 2-1 Surface water monitoring locations



2.2. Noise, Dust and Vibration monitoring locations

Noise, dust and air monitoring couldn't be conducted by the field team due to the rainy weather conditions.

3. Monitoring parameters and methodologies

3.1. Surface Water monitoring methodology

Monitoring parameters for surface water monitoring were provided by Client based on EIA requirements. List of parameters to be monitored and test methods are reflected in Table 3-1. National Maximum Allowable Concentrations (MAC) in surface waters have been used as a reference.

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Chemical Parameters	Measuring Unit	Test Method	National MAC
pH	-	SST ISO 10523:2010	6.5-8.5
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TSS	mg/l	SST ISO 11923: 2007	Increase by no more than 0.75
Total N	mg/l	GD 52.24.364-95	N/A
Total P	mg/l	SST ISO 6878:2004/2020	2
Nitrates (NO ₃)	mg/l	SST ISO 7890-3 : 2008	40
phosphates (PO ₄)	mg/l	SST ISO 6878:2004/2020	3.5
Oil & Grease	mg/l	EPA 413.1	0.3
Microbiological Parameters			
Total coliforms	MPN in 100 ml	SST ISO 9308 -1:2014/2014	400

The water samples are taken by the certified monitoring technicians, which are specially trained for the water sampling activities. The analysis of the water samples was conducted in the accredited DG Consulting Laboratory with ISO 17025 standard and if necessary, samples are sent to SYN LAB (Germany).

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Water and air quality samples taken during field activities were sent to DG consulting laboratory (Georgia) and SYN LAB (Germany) for analyses. Samples were analyzed in accordance analytical suites and test methods proposed in chapter

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5.1. Surface Water Monitoring field activities

Sampling activities were undertaken on 14/06/24. The field team included Lasha Bibichadze and Giorgi Guliashvili. As per initial request from the Client, monitoring plan was included 1 bridge construction sites up and down stream monitoring.

All of the proposed sampling points were sampled successfully during the field visit.

Figure 5-1 Bridge N3 upstream (Borimela River)



Figure 5-2 Bridge N3 downstream (Borimela River)



6. Analytical results and conclusions

6.1. Surface water monitoring

The results of surface water monitoring are indicated in the tables below:

Table 6-1 Bridge N3 (Borimela River) up and down stream monitoring results

Parameters	EIA Standards (National MAC)	Baseline results (June 2021)	Upstream	Downstream
pH	6.5-8.5	8.16	8.2	8.25
BOD	6mg/l	<3	<3	<3
COD	30mg/l	32	15	12
TSS	Increase no more than 0.75mg/l	20	15	20
Total N	N/A	1.5	0.7	0.9
Total P	2mg/l	0.15	0.07	0.1
Nitrates	40mg/l	4	<1	<1
Phosphates	3.5mg/l	0.45	0.21	0.3
Oil and Grease	0.3mg/l	<0.1	<0.3	<0.3
Total Coliforms	400MPN	ND	900	800

All the down-stream monitoring results are below the baseline monitoring results. No significant fluctuation was observed between up and down-stream locations monitoring results with exception of increased TSS concentration. This could be the result of the concrete batching plant operation which is located between up and down stream monitoring points.

სსიპ GAC



სსიპ „აკრედიტაციის ერთიანი ეროვნული ორგანო –
აკრედიტაციის ცენტრი“

აკრედიტაციის მოწმობა
EA BLA-ის ხელმოწერი

GAC-TL-0160
ადასტურებს, რომ
შპს „დგ კონსალტინგი“-ს
საგამოცდო ლაბორატორია
მდებარე: ქ. თბილისი, მირზა გელოვანი ქუჩა N10
შეფასდა და აკმაყოფილებს საქართველოს სტანდარტის
სსტ ისო/იეკ 17025:2017/2018-ის მოთხოვნებს

აკრედიტაციის სფერო მოცემულია აკრედიტაციის მოწმობის დანართში, რომელიც
წარმოადგენს მის განუყოფელ ნაწილს.

აკრედიტაციის ცენტრის
გენერალური დირექტორი

რეგისტრაციის თარიღი
04 ოქტომბერი 2021 წ.

ძალაშია
28 ივლისი 2025 წ.

სსიპ GAC



ბ.ა.

0186 თბილისი, ალ. ყაზბეგის გამზ. №42ა



1381

აკრედიტაციის მოწმობის N GAC-TL-0160

განკარგულება N06/177

თარიღი: 28.07.2021

„ვამტკიცებ“
აკრედიტაციის ცენტრის გენერალური დირექტორი

ნათია მიქელაძე



საგამოცდო ლაბორატორიის აკრედიტაციის სფერო
შპს „დგ კონსალტინგი“

მისამართი: ქ. თბილისი, მ. გელოვანის N10

სამოცდო ლაბორატორიის აკრედიტაციის სფერო

გამოცდა/ნიმუშის აღება						
ლაბორატორიის საბუთო უბნის/ფილიალის (ასეთის არსებობისას) №						
№	სეს/ესნ კოდი	გამოსაცდელი/ ნიმუშის აღების პროდუქტი/მასალა	გამოცდების სახეობა	საკვლევი პარამეტრები	გამოცდის/ნიმუშის აღების მეთოდის იდენტიფიკაცია და დასახელება	მოქმედი სფერო/ტიპი
1	2	3	4	5	6	7
1		გარემო (საცხოვრებელი და სამუშაო გარემო ღია და დახურულ სივრცეებში)	ინსტრუმენტალური მეთოდი ხელსაწყო - Micromate	კიბრაცია	DGL-IN 15-G-02 ვალიდირებული მეთოდი	
			ინსტრუმენტალური მეთოდი ხელსაწყო Rion NL-52	ხმაური	DGL-IN 09-G-03 ვალიდირებული მეთოდი	
2		ჰაერი	ინსტრუმენტალური მეთოდი ხელსაწყო - Dustrak DRX 8533	მტვერი აქტიური (მეისიერი)	DGL-IN 16-G-04 ვალიდირებული მეთოდი	
			ინსტრუმენტალური მეთოდი მტვრის საზომი Microdust Pro-აპარატი	მტვერი პასიური	DGL-PR 13-G-02 ვალიდირებული მეთოდი	

		ინსტრუმენტალური მეთოდი ანემომეტრი PCE-423	ჰაერის მოძრაობის სიჩქარე	ვალიდირებული მეთოდი DGL-IN 14-G-03	
		ინსტრუმენტალური მეთოდი ანემომეტრი PCE-423	ტემპერატურის განსაზღვრა	ვალიდირებული მეთოდი DGL-IN 14-G-03	
		ინსტრუმენტალური მეთოდი GASTEC GV-110S (იაპონია)	CO - ნახშირ (II) ჟანგი	ვალიდირებული მეთოდი DGL-IN 85-G-02	
		ინსტრუმენტალური მეთოდი GASTEC GV-110S (იაპონია)	NO ₂ - აზოტის (IV) ჟანგი	ვალიდირებული მეთოდი DGL-IN 85-G-02	
		ინსტრუმენტალური მეთოდი GASTEC GV-110S (იაპონია)	SO ₂ - ნახშირ (IV) ჟანგი	ვალიდირებული მეთოდი DGL-IN 85-G-02	
		ინსტრუმენტალური მეთოდი GASTEC GV-110S (იაპონია)	O ₃ - ოზონის განსაზღვრა	ვალიდირებული მეთოდი DGL-IN 85-G-02	
3	2201/22 02	წყლები, ბუნებრივი მტკნარი წყლები, ნატურალური ან ხელოვნური მინერალური	პოტენციომეტრული მეთოდი	წყალბადის მაჩვენებელი (pH)	სსტ ისო 10523:2010

6. აქტ

	წალეზის ჩათვლით, გაზიანი, შაქრისა ან სხვა დამატებული ან საგემოვნო-არომატული ნივთიერებების დამატების გარეშე, ყინული და თიფი/				
	წალეზი, მინერალურისა და გაზიანის ჩათვლით, შაქრისა ან სხვა დამატებული ან საგემოვნო-არომატული ნივთიერებების დამატების შემცველობით.				
		პოტენციომეტრული მეთოდი	ელემენტარობა, მინერალიზაცია (TDS)	სსტ ისო 7888 : 2007	
		პოტენციომეტრული მეთოდი	გახსნილი ჟანგბადი	სსტ ისო 5814:2012/2020	
		ტურბიდიმეტრია	სიმღვრივე	სსტ ისო 7027- 1:2016/2017	I
		სპექტოფოტომეტრი	ფერი	სსტ ისო 7887:2011/2013	
		ტიტრიმეტრია	ჯანგბადის პერმანგანატული მოხმარება	სსტ ისო 8467:2007	

ა. მ. მ.

		გრავიმეტრია	შეტყუანებული ნაწილაკები	სსტ ისო 11923:2007	
		გრავიმეტრია	ნავთობი და ზეთები	EPA 1664 EPA 413.1	
		სპექტოფოტომეტრი	NO2	სსტ ისო 6777:2008	I
		სპექტოფოტომეტრი	NO3	სსტ ისო 7890-3:2008	I
		სპექტოფოტომეტრი	NH4	სსტ ისო 7150-1:2010	I
		სპექტოფოტომეტრი	PO4	სსტ ისო 6878:2004/2020	I
		ფოტომეტრი	ნარჩენი ქლორი	ისო 7393-2:1985	I
		ტიტრიმეტრია	კალციუმი	სსტ ისო 6058:2008	
		ტიტრიმეტრია	მაგნიუმი	სსტ ისო 6059:2008	
		ტიტრიმეტრია	სიხისტე	სსტ ისო 6059:2008	
		ტურბიდიმეტრია	სულფატის განსაზღვრა	გოსტ 4389-78	
		ტიტრიმეტრია	ქლორიდის განსაზღვრა	სსტ ისო 9297:2008	
		ტიტრიმეტრია	ჰიდროკარბონატის განსაზღვრა	გოსტ 23268.3-78	

6. 

		ფესტრაცია და სპექტროფოტომეტრია	ფენოლი	EPA 420.1	I
		სპექტროფოტომეტრია	რკინა	EPA 8008	I
		სპექტროფოტომეტრია	სილიციუმი	სახელმძღვანელო დოკუმენტი 52.24.433- 2005	
		ტურბიდიმეტრია	ბარიუმი	ვალიდირებული მეთოდი DGL-IN 70-G-01	
		მიკრობიოლოგიური მაჩვენებლები			
		ნიბუშის მომზადება, დათესვა, კულტივირება	მეზოფილური აერობებისა და ფაულტაური ანაერობების რაოდენობა	სსტ ისო 6222:2008	I
		ფილტრაცია	ნაწლავური ჩხირის კოლიფორმ ბაქტერიები და E. coli	სსტ ისო 9308 - 1:2014/2014	I
		ფილტრაცია	S.faecalis	სსტ ისო 7899-2:2007	I
		ფილტრაცია	Pseudomonas aeruginosa	სსტ ისო 16266:2007	I
		ფილტრაცია	სულფიტმარედი რებული კლოსტრიდიები (Cl perfringens)	სსტ ისო 6461-2:2007	

4	2202/22 01	ზედაპირული წყლები (წყალსატევები, მდინარეები, ტბები, ზღვები და ა.შ.) და ჩამდინარე წყლები	პოტენციომეტრული მეთოდი	წყალბადის მაჩვენებელი (pH)	სსტ ისო 10523:2010	
			პოტენციომეტრული მეთოდი	ელექტრონული, მინერალიზაცია (TDS)	სსტ ისო 7888 : 2007	
			პოტენციომეტრული მეთოდი	გახსნილი ჟანგბადი	სსტ ისო 5814:2012/2020	
			ტურბიდომეტრია	სიმღვრივე	სსტ ისო 7027- 1:2016/2017	I
			ტიტრიმეტრია	ჟანგბადის ქიმიური მოხმარება COD	სსტ ისო 6060:2010	
			სპექტროფოტომეტრია	(მგ/ლ)	ისო 15705:2002	
			ტიტრიმეტრია	ჟანგბადის პერმანანტული მოხმარება (მგ/ლ)	სსტ ისო 8467:2007	
			პოტენციომეტრია	ჟანგბადის ბიოლოგიური მოხმარება BOD5 (მგ/ლ O2)	სსტ ისო 5815- 2:2003/2020	
			გრავიმეტრია	შეტენარებული ნაწილაკები	სსტ ისო 11923: 2007	

		გრავემეტრია	ნავთობი და ზეთები EPA 413.1	
		სპექტოფოტომეტრი	NO2	სსტ ისო 6777:2008
		სპექტოფოტომეტრი	NO3	სსტ ისო 7890-3:2008
		სპექტოფოტომეტრი	NH4	სსტ ისო 7150-1:2010
		სპექტოფოტომეტრი	Total N	სახელმძღვანელო დოკუმენტი 52.24.364-95
		სპექტოფოტომეტრი	PO4	სსტ ისო 6878:2004/2020
		ფოტომეტრი	ნარჩენი ქლორი	ისო 7393-2:1985
		ტიტრიმეტრია	კალციუმი	სსტ ისო 6058:2008
		ტიტრიმეტრია	მაგნიუმი	სსტ ისო 6059:2008
		ტურბიდიმეტრია	სულფატის განსაზღვრა	გოსტ 4389-78
		ტიტრიმეტრია	ქლორიდის განსაზღვრა	სსტ ისო 9297:2008
		ტიტრიმეტრია	ჰიდროკარბონატის განსაზღვრა	გოსტ 23268.3-78
		ექსტრაქცია და სპექტოფოტომეტრია	ფენოლი	EPA 420.1

		სპექტროფოტომეტრია	რეინა	EPA 8008	I
			ფორმალდეჰიდი	Hach Lang 200 Formaldehyde Test Kit, Model FM	I
			გლუტარალდეჰიდი	Hach, Glutaraldehyde Test Kit GT-1 (2587200)	
		მიკრობიოლოგიური მანკებლები			
		ნიმუშის მომზადება, დათესვა, კულტივირება	მეზოფილური აერობებისა და ფაქულტატიური ანაერობების რაოდენობა	სსტ ისო 6222:2008	I
		ფილტრაცია	საერთო კოლიფორმული ბაქტერიები და E. Coli	მეთოდური მითითებები 4.2.1884-04	I
		ფილტრაცია	S. faecalis	სსტ ისო 7899-2:2007 მეთოდური მითითებები 4.2.1884-04	I
5	წიაღავი	პოტენციომეტრული მეთოდი	pH	სსტ ისო 10390 : 2011	I
		პოტენციომეტრული მეთოდი, (Soil Oxygen Meter)	ვალიდირებული მეთოდი გახსნილი ქანგბადი	DGL-IN 28-G-01	I
		პოტენციომეტრული მეთოდი	მარილიანობა	ისო 11265:1994	I

		პოტენციური მეთოდი, (UMP 1)	ტენიანობა	ისო 10573:1995	I
		მოცულობითი	სიმკვრივე	ისო 11272:2017	I
		გრაფიკული	გრანულიმეტრია	სსტ ისო 11277: 2020	I
		სპექტროფოტომეტრია	ფოსფორის განსაზღვრა	ისო 11263:2015	I
6	წყალი სასმელი, წყაროს წყალი, ზედაპირული წყლები, ჩამდინარე წყალი	-	ნიმუშის აღება	ტექნიკური რეგლამენტი წყლის სინჯის აღების სანიტარული წესები (საქართველოს მთავრობის დადგენილება #26, 03.01.2014) სსტ ისო 19458: 11- წყლის ხარისხი. ნიმუშების აღება მიკრობიოლოგიური ანალიზისთვის	
7	ნიადაგი	-	ნიმუშის აღება	გარემოს ხარისხობრივი მდგომარეობის ნორმების დამტკიცების შესახებ ბრძანება №38/ნ 2003 წლის 24 თებერვალი. დასახლებული აღწერების ნიადაგის მდგომარეობის პიკეტუარი შეფასება	

				მეთოდური მითითება 2.1.7.003-02	
8	ჰაერი		ნიმუშის აღება	გოსტ 17.2.3.01-86. ბუნების დაცვა. ატმოსფერო. დასახლებული პუნქტების ჰაერის ხარისხის კონტროლის წყესები.	

საქ GAC



სსიპ „აკრედიტაციის ერთიანი ეროვნული ორგანო –
აკრედიტაციის ცენტრი“

აკრედიტაციის მოწმობა GAC-TL-0160

ადასტურებს, რომ

შპს „დგ კონსალტინგი“-ს
საგამოცდო ლაბორატორია

მდებარე: ქ. თბილისი, მ. გულოვანის #10

შეფასდა და აკმაყოფილებს ეროვნული სტანდარტის

სსტ ისო/იეკ 17025:2010-ის მოთხოვნებს

აკრედიტებულია შემდეგ სფეროში: 1. გარემო (საცხოვრებელი და სამუშაო გარემო ღია და დახურულ სივრცეებში); 2. ჰაერი; 3. წყალი - სასმელი (ბუტილირებული, წყალმომარაგების და ა.შ.); 4. წყალი ზედაპირული, ჩამდინარე; 5. ნიადაგი.
(იხ. დანართი „აკრედიტაციის სფერო“)

აკრედიტაციის ცენტრის
გენერალური დირექტორი

რეგისტრაციის თარიღი
15 აგვისტო 2017 წ.

ძალაშია
15 აგვისტო 2021 წ.

საქ GAC



0186 თბილისი, ად. ყაზბეგი

დამკვეთი: სსიპ „აკრედიტაციის ერთიანი ეროვნული ორგანო – აკრედიტაციის ცენტრი“
დამამზადებელი: შპს „სოლეი“ სფს-ს რეგისტრაციის № 06-3938

Laboratory of Excellence

DG Consulting Limited

*This laboratory has been recognized by ERA as a
Laboratory of Excellence for achieving 100% acceptable data in the*

May 2018 WP ERA Proficiency Testing Round 280

*which included 479 participating laboratories. This achievement is a demonstration of
the superior quality of this laboratory in evaluation of the analyte(s) listed below.*

n-Hexane Extractable Material (O&G/Gra)



Matthew Seabeck, Quality Officer



Laboratory of Excellence

DG Consulting Limited

This laboratory has been recognized by ERA as a
Laboratory of Excellence for achieving 100% acceptable data in the

May 2018 WS ERA Proficiency Testing Round 262

which included 255 participating laboratories. This achievement is a demonstration of
the superior quality of this laboratory in evaluation of the analyte(s) listed below.

Edil
Total Califorms




Matthew Seedeck, Quality Officer



Certificate of Recognition

DG Consulting Limited

ERA congratulates this laboratory for successful completion of the

January 2018 WS ERA Proficiency Testing Round 258

We recognize the performance of this laboratory for achieving an acceptable evaluation for the analyte(s) listed below.

Chloride
Nitrate as N
Turbidity

Conductivity at 25°C
Diss. Solids



Matthew Desbeck, Quality Officer



ხელშეკრულება საკონსულტაციო მომსახურებაზე თბილისი, საქართველო 26 ივნისი, 2021 წ
მხარეები
შპს ესდისი (SDSC) ს/ნ: 405335025 მისამართი: ქ. თბილისი, ვაკე-საბურთალოს რაიონი, მიხეილ თამარაშვილის გამზირი, #13, ბინა 17 მისი დირექტორის გიორგი გულიაშვილი-ს სახით (შემდგომში - დამკვეთი) და: შპს DG Consulting (ს/კ 205 280 998) მისამართი: თბილისი, მირზა გელოვანის 10, წარმოდგენილი მისი უფლება-მოხილი პირის, ბ-ნი დავით გირგვლიანის სახით (შემდგომში "კონტრაქტორი") დამკვეთი და კონტრაქტორი ერთობლივად მოიხსენებიან როგორც მხარეები, ხოლო ცალ-ცალკე, როგორც მხარე.
1. ხელშეკრულების საგანი
E-60 მაგისტრალის F4 მონაკვეთზე (ქვედა წევა - არგვეთა ზესტაფონის შემოვლითი გზა) გარემოსდაცვითი მონიტორინგის სამუშაოების განხორციელება
2. შესასრულებელი სამუშაო
2.1. სამუშაო ითვალისწინებს შემსრულებლის მიერ პერიოდული (ყოველთვიური) გარემოსდაცვითი მონიტორინგის სამუშაოების წარმოებას დანართ 1-ში მოცემული ერთეული ღირებულებების შესაბამისად. სამუშაოები შესრულდება სტანდარტული მეთოდების გამოყენებით. მონიტორინგული სამუშაოები მოიცავს: 2.2. ატმოსფერული ჰაერის მონიტორინგს; 2.3. მტვრის კონცენტრაციების განსაზღვრას 2.4. ხმაურისა და ვიბრაციის დონეების განსაზღვრას 2.5. ნიადაგისა და წყლის ქიმიურ და მიკრობიოლოგიურ ანალიზს 2.6. მიმდინარე ხელშეკრულების შესაბამისად შესასრულებელი სამუშაოები დაზუსტდება ყოველთვიურად მონიტორინგული სამუშაოების საჭიროების და მშენებლობის ეტაპების მიხედვით.
3. ღირებულება და გადახდის პირობები
3.1. "კონტრაქტორის" მიერ გაწეული მომსახურების სრული ღირებულება გამოითვლება ყოველთვიურად ფაქტიურად შესრულებული სამუშაოს მიხედვით, დანართში 1 მოცემული ერთეული ღირებულებების გათვალისწინებით. ერთეული ღირებულებების ცხრილი არ მოიცავს დამატებული ღირებულების გადასახადს, რომელიც დაემატება თვის განმავლობაში შესრულებული სამუშაოს ჯამურ ღირებულებას. 3.2. ანაზღაურება მოხდება ყოველთვიურად, ანაზღაურების დაგვიანების შემთხვევაში, მომდევნო თვის სამუშაოები გადაიწეოს. 3.3. შემსრულებლის მიერ ინვოისის წარდგენისას ასევე ელექტრონულად წარდგენილ უნდა იქნას ოფიციალური ანგარიშ ფაქტურა შემოსავლების სამსახურის ვებ-გვერდის (www.rs.ge) საშუალებით. 3.4. ანაზღაურება მოხდება ინვოისების წარდგენიდან 10 სამუშაო დღის ვადაში.

3.5. ხელშეკრულების ერთეული ფასები მოცემულია ლარში 2021 წლის ივნისისათვის არსებული ოფიციალური კურსის გათვალისწინებით იმ შემთხვევაში, თუ გაცვლითი კურსი შეიცვლება 20%-ზე მეტი სიდიდით, ერთეული ღირებულებებიც შეიცვლება ურთიერთმოლაპარაკების საფუძველზე.

4. მხარეთა ვალდებულებები

4.1. შემსრულებელი ვალდებულია:

4.1.1. გულისხმობითა და პასუხისმგებლობით შეასრულოს მასზე დაკისრებული მოვალეობები მისი კომპეტენციისა და კვალიფიკაციის გათვალისწინებით;

4.1.2. დაიცვას კონფიდენციალურობა ხელშეკრულების ძალაში ყოფნის მთელი ვადის განმავლობაში და ამ ვადის გასვლიდან 6 (ექვსი) თვის განმავლობაში.

4.2. დამკვეთი ვალდებულია:

4.2.1. დროულად მიაწოდოს კონტრაქტორს სრული ინფორმაცია სახელშეკრულებო ვალდებულებების ჯეროვანი შესრულებისთვის.

4.2.2. უზრუნველყოს შემსრულებლის ხელშეწყობა საფულე სამუშაოების პროცესში.

4.2.3. უზრუნველყოს კონტრაქტორის მიერ წარდგენილი დოკუმენტაციის დროულად განხილვა და მიღება.

5. ხელშეკრულების მოქმედების ვადა

5.1. ხელშეკრულება ძალაში შედის მხარეთა მიერ მისი ხელმოწერის მომენტიდან და სრულ და ჯეროვანად შესრულებამდე.

5.2. ხელშეკრულება ითვალისწინებს დანართი 1-ით განსაზღვრული სამუშაოების შესრულებას

5.3. საჭიროების შემთხვევაში, მხარეები შეთანხმდებიან ხელშეკრულების გაგრძელებაზე ან ახალი ხელშეკრულების გაფორმებაზე.

6. ხელშეკრულების ვადამდე შეწყვეტა

6.1. ნებისმიერ მხარეს ყოველგვარი საფუძვლის გარეშე შეუძლია წინამდებარე ხელშეკრულების ვადის გასვლამდე შეწყვეტა მეორე მხარისთვის არა უგვიანეს ერთი თვით ადრე წერილობითი შეტყობინების გაგზავნით.

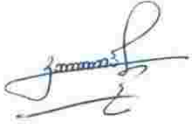
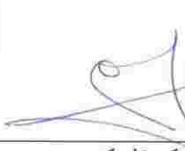
6.2. ხელშეკრულების შეწყვეტისას დამკვეთი ანაზღაურებს მხოლოდ კონტრაქტორის მიერ შეტყობინების მიღების თარიღისთვის შესრულებულ სამუშაოს. თუ ამ დროისათვის ანალიტიკური სამუშაოები განხორციელების პროცესშია, მაშინ, დამკვეთი ვალდებულია ანაზღაუროს აღნიშნული ანალიტიკური სამუშაო.

7. ინტელექტუალური საკუთრების უფლება

6.1. წინამდებარე ხელშეკრულების საფუძველზე, კონტრაქტორისათვის სრული ანაზღაურების განხორციელების შემდეგ, დამკვეთს გადაეცემა ინტელექტუალური საკუთრების უფლებები ხელშეკრულების ფარგლებში მომზადებულ ყველა მასალაზე.

8. მოქმედი სამართალი და დავების გადაწყვეტის წესი

8.1. წინამდებარე ხელშეკრულება შედგენილია და რეგულირდება ქართული სამართლის შესაბამისად.

8.2. მხარეთა შორის წარმოქმნილი სადავო საკითხები შესაძლებლობიდან გამომდინარე წყდება ურთიერთშეთანხმებითა და მოლაპარაკების გზით; 8.3. იმ შემთხვევაში, თუ კონსულს არ იქნება მიღწეული, დავა გადაწყდება სასამართლოს გზით საქართველოს კანონმდებლობის შესაბამისად.	
9. დასკვნითი დებულებები 8.1 ნებისმიერი გადახრა ან ცვლილება ამ ხელშეკრულების პირობებში დაიშვება მხოლოდ ორივე მხარის მიერ ხელმოწერილი წერილობითი შეთანხმების საფუძველზე. 8.2 ხელშეკრულება შედგენილია 2 ეგზემპლარად ქართულ ენაზე.	
10. საბანკო რეკვიზიტები	
„დამკვეთი“: შპს ესდიესი (SDSC) ს/ნ: 405335025 მისამართი: ქ. თბილისი, ვაკე-საბურთალოს რაიონი, მიხეილ თამარაშვილის გამზირი, #13, ბინა 17. სს „საქართველოს ბანკი“ ანგარიში ნომერი: GE18BG0000000365814743	„კონტრაქტორი“ შპს DG Consulting, ს/კ 205 280 998 მისამართი: თბილისი, მირზა გელოვანის 10, მიმღები: შპს „დგ კონსალტინგი“ მიმღების ბანკი: თბილისი ბანკი ა/ანგარიში (ლარი) GE16TB0669136020100005
მხარეთა ხელმოწერები	
„დამკვეთი“-ს სახელით: შპს ესდიესი (SDSC) ს/ნ: 405335025 მისამართი: ქ. თბილისი, ვაკე-საბურთალოს რაიონი, მიხეილ თამარაშვილის გამზირი, #13, ბინა 17.	„კონტრაქტორი“-ს სახელით შპს DG Consulting, ს/კ 205 280 998 მისამართი: თბილისი, მირზა გელოვანის 10.
 	 
დირექტორი - გიორგი გულიაშვილი	დირექტორი - დავით გოგოლაშვილი
დამატებითი დოკუმენტები - დანართი 1	

Annex 4: Sample Attendance Sheet



TRAINING ATTENDANCE/დასწრების ფორმა/培训签到表

LOCATION: E60 EWH F4:

DATE: 09.01.2024

ადგილმდებარეობა E60 EWH F4: Interchange № 1, Concrete batching plant № 1, BRG-4103, Tunnel № 4003

位置: E60 EWH F4:

TRAINING TUTOR:

ტრენერი: David Kurdadze

培训讲师

SUBJECT:

საკითხი: WMP; PMP; Housekeeping and Waste segregation, Refueling procedures, Hazardous waste handling and storage

主题:

	სახელი და გვარი NAME 名称	კომპანია NAME OF EMPLOYER 公司	პოზიცია position 职位	ხელმოწერა Signature 签名
1	მ. მჩიჭვიძე სერგო	G.H.E.C.	Loader Operator	ს. მჩიჭვიძე
2	ს. სიხაძე გენაძე	"	Exc. Operator	ს. სიხაძე
3	მ. მჩიჭვიძე დავით	"	Loader Operator	მ. მჩიჭვიძე
4	მ. მჩიჭვიძე გიორგი	"	Exc. Operator	მ. მჩიჭვიძე
5	ს. სიხაძე გიორგი	"	Dump Truck Driver	ს. სიხაძე
6	მ. მჩიჭვიძე გიორგი	"	Loader Operator	მ. მჩიჭვიძე
7	მ. მჩიჭვიძე გიორგი	"	Mixer Operator	მ. მჩიჭვიძე
8	მ. მჩიჭვიძე გიორგი	"	"	მ. მჩიჭვიძე
9	მ. მჩიჭვიძე გიორგი	"	"	მ. მჩიჭვიძე
10	მ. მჩიჭვიძე გიორგი	"	"	მ. მჩიჭვიძე
11	მ. მჩიჭვიძე გიორგი	C.H.E.C.	Mixer Operator	მ. მჩიჭვიძე
12	მ. მჩიჭვიძე გიორგი	"	Dump Truck Driver	მ. მჩიჭვიძე
13	მ. მჩიჭვიძე გიორგი	"	"	მ. მჩიჭვიძე
14	მ. მჩიჭვიძე გიორგი	"	"	მ. მჩიჭვიძე
15	მ. მჩიჭვიძე გიორგი	"	"	მ. მჩიჭვიძე
16	მ. მჩიჭვიძე გიორგი	"	Dump Truck Driver	მ. მჩიჭვიძე

Guizhou Highway Engineering Group Co Ltd and China National Technical Import & Export Corporation Joint

TRAINING ATTENDANCE/დასწრების ფორმა/培训签到表

LOCATION: E60 EWH F4:

DATE: 15.02.2024

ადგილმდებარეობა E60 EWH F4: Interchange № 2; Mechanical Workshops; Steel mounting workshop

位置: E60 EWH F4:

TRAINING TUTOR:

ტრენერი: _____ David Kurdadze _____

培训讲师

SUBJECT:

საკითხი: WMP; Hazardous and Non-Hazardous Waste Handling, Segregation and Storage

主题:

	სახელი და გვარი NAME 名称	კომპანია NAME OF EMPLOYER 公司	პოზიცია position 职位	ხელმოწერა Signature 签名
1	ქვენი მასაჟი	GHEC	რამდენი	ქ. ქ.
2	ქვენი მასაჟი	GHEC	რამდენი	ქ. ქ.
3	სოფლი წყარო	GHEC	რამდენი	ქ. ქ.
4	ბაქალავანტა	GHEC	რამდენი	ქ. ქ.
5	ბაქალავანტა	GHEC	რამდენი	ქ. ქ.
6	ბაქალავანტა	GHEC	რამდენი	ქ. ქ.
7	ბაქალავანტა	GHEC	რამდენი	ქ. ქ.
8	ბაქალავანტა	GHEC	რამდენი	ქ. ქ.
9	ბაქალავანტა	GHEC	რამდენი	ქ. ქ.
10	ბაქალავანტა	GHEC	რამდენი	ქ. ქ.
11	ბაქალავანტა	GHEC	რამდენი	ქ. ქ.
12	ბაქალავანტა	GHEC	რამდენი	ქ. ქ.
13				
14				
15				
16				

Guizhou Highway Engineering Group Co Ltd and China National Technical Import & Export Corporation Joint

TRAINING ATTENDANCE/დასწრების ფორმა/培训签到表

LOCATION: E60 EWH F4:

DATE: 21.03.2024

ადგილმდებარეობა E60 EWH F4: RoW pk 10+000 to pk 14+750

位置: E60 EWH F4:

TRAINING TUTOR:

ტრენერი: _____ David Kurdadze _____

培训讲师

SUBJECT:

საკითხი: Topsoil Management Plan; WMP; Waste removal and housekeeping before distribution and ling of topsoil

主题:

	სახელი და გვარი NAME 名称	კომპანიის NAME OF EMPLOYER 公司	პოზიციის position 职位	ხელმოწერა Signature 签名
1	პაყა პატსაძე	CHEC	კანტინის დამმუშავებელი	პ. პაყაძე
2	მომინი ტყეშელაშვილი	CHEC	მუშა	მ. ტყეშელაშვილი
3	გეგმატ. ჯანაძე	CHEC	მუშა	გ. ჯანაძე
4	კახიანი ვახტანგ	CHEC	მუშა	კ. კახიანი
5	ბეჭაძე თინათინი	CHEC	დამმუშავებელი	ბ. ბეჭაძე
6	ნუგზარ ფილიპოვი	check	საიტის მართვა	ნ. ფილიპოვი
7	მამუკაშვილი	check	მუშა	მ. მამუკაშვილი
8	გიგა სამხაძე	CHEC	მუშა	გ. სამხაძე
9	ლევ სილაძე	CHEC	მუშა	ლ. სილაძე
10	ბახიანი ვახტანგ	CHEC	მუშა	ბ. ვახტანგ
11	ბახიანი ვახტანგ	CHEC	მუშა	ბ. ვახტანგ
12	ახიანი ვახტანგ	CHEC	მუშა	ახიანი ვახტანგ
13	ბახიანი ვახტანგ	CHEC	მუშა	ბ. ვახტანგ
14	ბახიანი ვახტანგ	CHEC	მუშა	ბ. ვახტანგ
15	ბახიანი ვახტანგ	CHEC	მუშა	ბ. ვახტანგ
16	ბახიანი ვახტანგ	CHEC	მუშა	ბ. ვახტანგ

Guizhou Highway Engineering Group Co Ltd and China National Technical Import & Export Corporation Joint

TRAINING ATTENDANCE/დასწრების ფორმა/培训签到表

LOCATION: E60 EWH F4:

DATE: 22.04.2024

ადგილმდებარეობა E60 EWH F4: RoW pk 10+000 to pk 14+750

位置: E60 EWH F4:

TRAINING TUTOR:

ტრენერი: _____ David Kurdadze _____

培训讲师

SUBJECT:

საკითხი: Topsoil Management Plan; WMP; Waste removal and housekeeping before distribution and ling of topsoil

主题:

	სახელი და გვარი NAME 名称	კომპანია NAME OF EMPLOYER 公司	პოზიცია position 职位	ხელმოწერა Signature 签名
1	მ. შიჩიშვილი სერგო	G.H.E.C.	Loader Operator	ს. შიჩიშვილი
2	ლ. სიხუაძე გენაძე	"	Exc. Operator	ლ. სიხუაძე
3	რ. სიხუაძე დავით	"	Loader Operator	რ. სიხუაძე
4	შ. შიჩიშვილი გელა	"	Exc. Operator	შ. შიჩიშვილი
5	ს. სიხუაძე გიორგი	"	Dump Truck Driver	ს. სიხუაძე
6	ლ. სიხუაძე გიორგი	"	Loader Operator	ლ. სიხუაძე
7	ი. სიხუაძე გიორგი	"	Mixer Operator	ი. სიხუაძე
8	მ. სიხუაძე კონსტანტინე	"	"	მ. სიხუაძე
9	გ. სიხუაძე გიორგი	"	"	გ. სიხუაძე
10	ჭ. სიხუაძე გიორგი	"	"	ჭ. სიხუაძე
11	მ. სიხუაძე დავით	C.H.E.C.	Mixer Operator	მ. სიხუაძე
12	ქ. სიხუაძე გიორგი	"	Dump Truck Driver	ქ. სიხუაძე
13	ჭ. სიხუაძე გიორგი	"	"	ჭ. სიხუაძე
14	შ. სიხუაძე გიორგი	"	"	შ. სიხუაძე
15	გ. სიხუაძე გიორგი	"	"	გ. სიხუაძე
16	კ. სიხუაძე კონსტანტინე	"	Dump Truck Driver	კ. სიხუაძე

Guizhou Highway Engineering Group Co Ltd and China National Technical Import & Export Corporation Joint

TRAINING ATTENDANCE/დასწრების ფორმა/培训签到表

LOCATION: E60 EWH F4:

DATE: 17.05.2024

ადგილმდებარეობა E60 EWH F4: RoW pk 10+000 to pk 14+750

位置: E60 EWH F4

TRAINING TUTOR:

ტრენერი: _____ David Kurdadze

培训讲师:

SUBJECT: Topsoil Management Plan; WMP; Waste removal and housekeeping before distribution and ling of topsoil,

საკითხი: and Re-Cultivation Plan

主题:

	სახელი და გვარი NAME 名称	კომპანიის NAME OF EMPLOYER 公司	პოზიციის position 职位	ხელმოწერა Signature 签名
1	პაყა პატსაძე	CHEC	კანტინის დამმუშავებელი	პ. პაყაძე
2	მომინი ტყეშელაშვილი	CHEC	მუშა	მ. ტყეშელაშვილი
3	გეგმატ. ჯანაძე	CHEC	მუშა	გ. ჯანაძე
4	კახიანი ვახტანგ	CHEC	მუშა	კ. კახიანი
5	ბეჭაძე თინათინი	CHEC	დამმუშავებელი	ბ. ბეჭაძე
6	ნუგზარ ფილიპოვი	CHEC	საიტის მართვა	ნ. ფილიპოვი
7	მომინი ფილიპოვი	CHEC	მუშა	მ. ფილიპოვი
8	გიგა სამხაძე	CHEC	მუშა	გ. სამხაძე
9	ლევ სილაძე	CHEC	მუშა	ლ. სილაძე
10	ბახჩაძე ვახტანგ	CHEC	მუშა	ბ. ბახჩაძე
11	ბახჩაძე ვახტანგ	CHEC	მუშა	ბ. ბახჩაძე
12	ანდრონიკი ვახტანგ	CHEC	მუშა	ან. ვახტანგ
13	მედი სილაძე	CHEC	მუშა	მ. სილაძე
14	ქუთაძე ვახტანგ	CHEC	მუშა	ქ. ვახტანგ
15	ფილიპოვი სილაძე	CHEC	მუშა	ფ. სილაძე
16	სამხაძე ვახტანგ	CHEC	მუშა	ს. ვახტანგ

Guizhou Highway Engineering Group Co Ltd and China National Technical Import & Export Corporation Joint

TRAINING ATTENDANCE

LOCATION: E60 EWH F4:

DATE: 17.06.2024

ადგილმდებარეობა E60 EWH F4: Interchange № 2; Mechanical Workshops; Steel mounting workshop

位置: E60 EWH F4

TRAINING TUTOR:

ტრენერი: David Kurdadze

培训讲师:

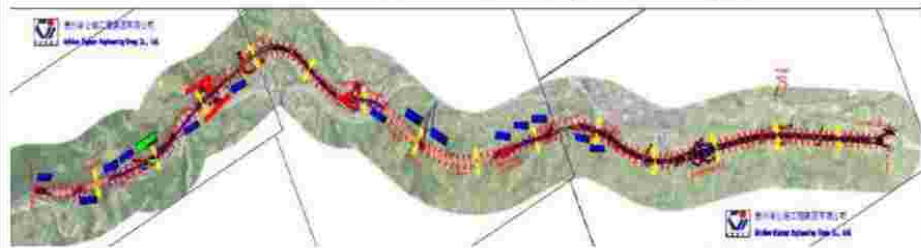
SUBJECT: Topsoil Management Plan; WMP; Waste removal and housekeeping before distribution and ling of topsoil,

საკითხი: and Re-Cultivation Plan, PPMP; Dust monitoring and control

主题:

	სახელი და გვარი NAME 名称	კომპანია NAME OF EMPLOYER 公司	პოზიცია position 职位	ხელმოწერა Signature 签名
1	ფიქსონ სხიპიძე	GHEC	დამბაძე	ფ. სხიპიძე
2	მეჩო მუხიშვილი	GHEC	ბრძანდარი	მ. მუხიშვილი
3	მეჩო მუხიშვილი	GHEC	დამბაძე	მ. მუხიშვილი
4	ილია სამხრელი	GHEC	დამბაძე	ი. სამხრელი
5	თორნიკე მუხიშვილი	GHEC	ბრძანდარი	თ. მუხიშვილი
6	დავით მუხიშვილი	GHEC	დამბაძე	დ. მუხიშვილი
7	საბუხარ სამხრელი	GHEC	დამბაძე	ს. სამხრელი
8	დავით მუხიშვილი	GHEC	დამბაძე	დ. მუხიშვილი
9	გიორგი მუხიშვილი	GHEC	დამბაძე	გ. მუხიშვილი
10	საბუხარ სამხრელი	GHEC	დამბაძე	ს. სამხრელი
11	გიორგი მუხიშვილი	GHEC	დამბაძე	გ. მუხიშვილი
12	გიორგი მუხიშვილი	GHEC	დამბაძე	გ. მუხიშვილი
13	გიორგი მუხიშვილი	GHEC	დამბაძე	გ. მუხიშვილი
14	გიორგი მუხიშვილი	GHEC	დამბაძე	გ. მუხიშვილი
15	გიორგი მუხიშვილი	GHEC	დამბაძე	გ. მუხიშვილი
16				

Annex 5: Clearance, Re-vegetation and Restoration Management Plan & Tree Compensation Plan

 贵州省公路工程集团有限公司 GUIZHOU HIGHWAY ENGINEERING GROUP CO., LTD.		 中國技術進出口總公司 CHINA NATIONAL TECHNICAL IMP. & EXP. CORP.			
SHORAPANI-ARGVETA Section (E60 highway route) F4 section plan  Shorapani-Argveta F4 Section					
  ROADS DEPARTMENT OF GEORGIA		Road department of Georgia of The Ministry of Regional Development and Infrastructure of Georgia			
 ULUSLARARASI BİRLEŞMİŞ MÜŞAVİRLER MÜŞAVİRLİK HİZMETLERİ A.Ş. Construction Supervision Consultant for E60 Highway F4 Shorapani-Argveta Project		Engineer: UBM Uluslararası Birleşmiş Müşavirler Müşavirlik Hizmetleri A.Ş. (Turkey)			
 		Contractor: Guizhou Highway Engineering Group Co. & China National Technical Import and Export Corporation Joint venture			
CONSTRUCTION OF SHORAPANI-ARGVETA SECTION (E60 HIGHWAY ROUTE) LOT F4 Contract No. SARP/CW/OCB-01 Clearance, Re-Vegetation and Restoration Management Plan					
Prepared by: Guizhou Highway Engineering Group Co. & China National Technical Import and Export Corporation Joint venture					
Reviewed by: Mei Shilun, Project Manager					
Submitted for: Approval					

Clearance, Re-Vegetation and Restoration Management Plan

Clearance, Re-Vegetation and Restoration Management Plan

**Prepared by: Guizhou Highway Engineering Group Co. & China National Technical Import and
Export Corporation Joint venture**

Reviewed by: Mei Shilun Project Manager



F4 Section (Kveda Tseva-Argveta) - Khevi-Ubisa-Shorapani-Argveta, E60 EWH

Table of Contents

1.	INTRODUCTION.....	4
1.1	PROJECT OVERVIEW.....	4
1.2	ABBREVIATIONS.....	4
1.3	DEFINITIONS.....	5
1.4	REFERENCES.....	5
1.5	PURPOSE AND OBJECTIVES OF THE DOCUMENT.....	5
2.	CLEARANCE WORKS.....	12
2.1	SITE DEMARCATION.....	12
2.2	TREE CUTTING.....	12
2.2.1	TREE INVENTORY AND PERMITTING.....	12
2.2.2	REMOVAL OF TREES.....	13
2.2.3	HANDOVER OF TIMBER.....	13
2.2.4	SURVEY OF GEORGIAN RED-LIST SPECIES WITHIN 5-METER BUFFER ZONE.....	14
2.3	TOPSOIL MANAGEMENT.....	14
2.4	SUBSOIL MANAGEMENT.....	14
2.5	TEMPORARY EROSION CONTROL WORKS.....	15
2.6	SPOIL DISPOSAL SITES.....	16
2.7	WORKS AT OR ADJACENT TO WATERCOURSES AND WATERCOURSE CROSSINGS.....	16
3.	REINSTATEMENT (RESTORATION) WORKS.....	17
3.1	REINSTATEMENT OF SUBSOIL.....	17
3.2	REINSTATEMENT OF TOPSOIL.....	17
3.3	SLOPES.....	18
3.4	WATERCOURSES CROSSING.....	23
3.5	TEMPORARY FACILITIES (CAMPS, WORKS AREAS, BATCHING PLANTS, LAYDOWN AREAS, SPOIL DISPOSAL SITES).....	23
4.	RE-VEGETATION AND BIORESTORATION.....	23
4.1	SEEDING.....	23
4.2	RED LIST SPECIES PLANTING.....	24
4.2.1	OVERVIEW OF AFFECTED TREE SPECIES.....	24
4.2.2	COMPENSATION PLANTING APPROACH.....	26
4.3	PLANTING OF SHRUBS ON DIVIDING STRIP.....	27
5.	MAINTENANCE AND MONITORING.....	27
	ANNEX 1: RED LIST TREE SURVEY (WITHIN 5 METER BUFFER ZONE).....	27
	ANNEX 2: TYPICAL SLOPE PROTECTION DRAWINGS.....	28

1. INTRODUCTION

1.1 Project Overview

The East–West Highway (EWH) Improvement Project involves construction of a new road section of the E60 highway located in Imereti Region of central Georgia (see **Figure 1**). Section F4 forms the Shorapani–Argveta (Kveda Tseva–Argveta) portion of the Khevi–Ubisa–Shorapani–Argveta section of the E60. 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.

The Project also includes construction of five long span bridges and one short span bridge. The total length of the five bridges is 4,912 meters, the longest of which is 941 meters.

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

There are four interchanges planned in F4 Section.

The Project is financed by the Asian Development Bank (ADB).

The Roads Department (RD) of the Ministry of Regional Development and Infrastructure of Georgia (MRDI) is wholly responsible for the implementation of the Project.

RD has selected an Engineer (Works Supervisor) a JV between international engineering/construction companies UBM Uluslararası Birleşmiş Müşavirler Müşavirlik Hizmetleri A.Ş. (Turkey) and SMEC International PTY LTD (Australia).

Construction Contractor is Guizhou Highway Engineering Group Co.

Construction Contractor's Consultant in occupational health and safety, social and environmental issues is Capto BMG LLC.

1.2 Abbreviations

Abbreviation/ Acronym	Description
ADB	Asian Development Bank
CBPP	Concrete Batching Plant Plan
CLO	Community Liaison Officer
EO	Environmental Officer
EIA	Environmental Impact Assessment
EPRP	Emergency Preparedness and Response Plan
E&S	Environmental and Social
ESMP	Environmental and Social Management Plan
EWH	East–West Highway
GoG	Government of Georgia
GRM	Grievance Redress Mechanism
H&S	Health and Safety
MEPA	The Ministry of Environmental Protection and Agriculture of Georgia
MRDI	Ministry of Regional Development and Infrastructure of Georgia
PAP	Project Affected Person
PK	Picket – 100 meter long section of the road
PM	Project Manager
RD	The Roads Department

Clearance, Re-Vegetation and Restoration Management Plan

Abbreviation/ Acronym	Description
RoW	Right of Way
STP	Sewage Treatment Plant

1.3 Definitions

Term	Definition
Project	F4 Section (Kveda Tseva-Argveta) - Khevi-Ubisa-Shorapani-Argveta, E60 EWH
Engineer	Work Supervisor selected by RD JV UBM Uluslararası Birleşmiş Müşavirler Müşavirlik Hizmetleri A.Ş. (Turkey) and SMEC International PTY LTD (Australia)
Contractor	Construction Contractor Guizhou Highway Engineering Group Co.
Contractor's Consultant	Contractor's Consultant in occupational health and safety, social and environmental issues Capto BMG LLC
Sub-Contractor	Means any party to a sub-contract including its employees and agents
Stakeholder	Means any party that has an interest in a Project and can either affect or be affected by the Project
Waste	Materials produced during operational activities which are of no use or value to the process that generated them

1.4 References

Document Number	Document Title
Project Number: 53178-001	Environmental Impact Assessment (EIA) - ADB
Contract No.: RCIP/CS/QCBS-17	Environmental Impact Assessment (EIA) - Georgia
	The Site Programme for F4 Project
	Air Quality Plan
	Community Health and Safety Plan
	Emergency Preparedness and Response Plan
	Environmental and Social Management Plan
	Grievance Redress Mechanism
	Groundwater Management Plan
	Noise Management Plan
	Occupational Health and Safety Plan
	Re-cultivation Plan
	Spill Response Plan
	Traffic Management Plan
	Waste Management Plan

1.5 Purpose and Objectives of the Document

The purpose of this document is to provide the framework for site clearance, including tree cutting and permanent reinstatement (restoration) activities for all areas disturbed by project works, including temporary facilities, such as construction camps, work areas, batching plants, laydown areas and temporary access roads/tracks and other transport facilities. The plan also covers biorestoration and off-set planting of Georgian Red List trees removed from State Forest Fund land as required by ADB EIA and MEPA's Environmental Decision approval condition. While briefly overviewed in the plan, Spoil Disposal Sites (for spoil generated during tunneling/slope cutting works) are covered under separate Spoil Disposal Plans that

Clearance, Re-Vegetation and Restoration Management Plan

are approved by the Engineer and MEPA. Therefore, site specific details regarding those areas will be described in noted standalone plans. Same applies to topsoil stripping and storage. Details regarding those activities are presented in Topsoil Stripping and Storage Plan.

Objectives of the plan is to ensure:

- Restoring, or facilitating the conditions to restore the complex ecology existing before construction, particularly the variety and distribution pattern of plant species;
- Habitat restoration through planting and maintenance of trees and shrubs;
- Restoring the contours, topography, soil profile and drainage patterns of the corridor and ancillary facility sites to pre-existing conditions, to the maximum extent practicable;
- Re-establishing soil profiles and sufficient vegetative cover to minimize erosion through restoration of the native plant community;
- Restoring to original condition, or better, any watercourse, infrastructure, structures, buildings, or agricultural land disturbed by the road corridor during construction;
- Maintaining soil stability and road integrity in the short term until longer term restoration occurs;
- Ensuring that no net loss of habitat occurs.

This Plan will apply to all works conducted by Contractor, including those of its subcontractors and relevant suppliers to the extent that Contractor has influence over HSE performance (e.g. aggregate sourcing site pollution prevention).

Contractor will carry out reinstatement and erosion control in accordance with project Environmental Impact Assessments and commitments made in EIAs. Clearance, Re-Vegetation and Restoration specific commitments are summarized in the **Table 1** below.

Table 1: ADB and Georgian EIA Commitments related to Clearance, Re-Vegetation and Restoration

Source of Commitment	Topic	Commitment Text
ADB EIA	Soil Erosion	Measures to control erosion will be outlined in the Contractors Clearance, Re-vegetation and Restoration Management Plan.
ADB EIA	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 modified habitat that will be cleared prior to the start of construction. The plan 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. - The total area to be restored / re-planted shall be 14.9 hectares as per Table 85. - The contractor re-vegetation and restoration management plan will meet ADB requirements for No Net Loss for Natural Habitat. - 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

Clearance, Re-Vegetation and Restoration Management Plan

Source of Commitment	Topic	Commitment Text
		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.
ADB EIA	Loss of Topsoil	- 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.
ADB EIA	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.
ADB EIA	Habitat	The Contractor, shall implement a Clearance, Re-vegetation and Restoration Management Plan which includes the measures for the restoration of modified habitat. The plan should be prepared by qualified national biodiversity specialists. The Contractor will be responsible for planting and maintenance of trees and shrubs in accordance with the plan during the construction and defects liability period of the Project. During this phase the Engineer will undertake monthly monitoring of the re-planted areas and report on the success rate of the planted areas, which should be above 80%. If the success rate falls below 80% the Contractor will re-plant on a 1:1 basis to compensate for losses. The Contractor will be responsible for paying for any compensational re-planting. The Contractor shall also include in his Clearance, Re-vegetation and Restoration Management Plan measures to restore any affected habitat at his spoil disposal sites. Siting of spoil disposal areas within natural habitat will not be allowed under the Project. The Contractor will prepare a Biodiversity Action Plan - BAP (An outline of the plan is provided by Appendix L). The Plan

Clearance, Re-Vegetation and Restoration Management Plan

Source of Commitment	Topic	Commitment Text
		specifies the specific actions to be undertaken to ensure no net loss of natural habitat. The actions required (e.g. locations for planting) will be determined between the Contractor, RD and the National Forestry Agency. The National Forestry Agency will be responsible for implementation of the natural habitat restoration specified in the BAP via direct funding from the RD.
ADB EIA	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.
ADB EIA	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.
ADB EIA	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.
ADB EIA	Habitat Restoration Vegetation Clearance	No chemicals shall be used to clear vegetation.
Order N2-181 of the Minister of Environment Protection and Agriculture on Approval of Environmental Decision (3.9)	Tree cutting	As it is impossible to reinstate and maintain forest areas in their current form, prior to start of highway operation, submit offset or eco-compensation measures (equivalent forest habitat reinstatement plan) to the Ministry of Environment Protection and Agriculture that places special emphasis on red data species.
Georgian EIA	Topsoil Management	Topsoil shall be stripped prior to starting construction of plain sections of the road. Topsoil will be used for seeding of perennial plants on slopes.
Georgian EIA	Site Preparation for Final Reinstatement	Construction process cover number of activities, namely: - Clearance of ROW prior to start of construction; topsoil stripping and temporary storage in order to use it after completion of construction for reinstatement (re-cultivation) of land damaged or used temporarily; - Profiling of the area and arrangement of drainage/culverts; - Tunneling; - Tunnel spoil disposal; - Arrangement of bridge pillars and foundations; - Arrangement of road foundation. Soil compaction using equipment. Delivery aggregate, spreading and compaction;

Clearance, Re-Vegetation and Restoration Management Plan

Source of Commitment	Topic	Commitment Text
		- Arrangement of upper layer of the road; - Finalizing of road construction as per international standards and marking; - Landscaping – tree planting on temporarily disturbed areas and grass seeding as per re-cultivation plan.
Georgian EIA	Topsoil Management	Volume of topsoil to be stripped during project implementation is approximately Xm3. It will be temporarily stored along the ROW or adjacent land as per applicable permit. Storage location will be specified by the construction contractor.
Georgian EIA	Topsoil Management	Impact on topsoil is relatively conditional, since soil stripped within the ROW will be used for re-cultivation after completion of construction. Area used for storage of topsoil (before use for re-cultivation) will be selected based on environmental norm and surrounding environment and will include as a minimum the following: area will be as far as possible from surface water bodies; will be plain; will be protected from scouring and wind erosion. Selected area will be agreed with the environmental regulator. In case of usage of private land/lands temporarily, compensation will be paid as per Land Acquisition and Resettlement Plan. To avoid damage, requirements of the Technical Regulation approved by Governmental Decree N424 dated December 31, 2013 on "Topsoil Stripping, Storage, Usage and Re-Cultivation" will be followed. Topsoil will be stored separately from the material used for road construction. Safe height and slope of the stockpiles will be maintained. Area will be protected from movement/compaction/contamination from construction vehicle/equipment.
Georgian EIA	Topsoil Management	In order to avoid or minimize impact on soil, the following measures will be implemented: - Vegetation cover will be retained as much as possible; - To prevent loss of topsoil, it will be stripped and stored temporarily prior to use for re-cultivation; - To maintain quality of topsoil, it will not be mixed with subsoil during stripping; - Topsoil will be stripped and stored in compliance with applicable regulations; - Safe slope will be maintained when arranging the stockpiles, surface water drainage will be arranged; For stability, height of stockpiles will not exceed 2 meters. Stockpiles will be located considering protection from erosion and scouring; - Topsoil compaction will be avoided by strict adherence to boundaries of roads, works areas and camps (if applicable); - As soon as there is no more impact, reinstatement activities will commence; - Temporary fuel storage tank (if applicable), will be located within impermeable area surrounded by berms. Any spill

Clearance, Re-Vegetation and Restoration Management Plan

Source of Commitment	Topic	Commitment Text
		will be retained inside the bund and cleaned up using absorbents; - Equipment maintenance and/or refueling on the works areas will be limited as much as possible. Priority will be given to usage of commercial maintenance workshops outside the work areas if possible. If it is necessary, special areas will be designated for such purpose. Area will be for protection from accidental spills (bundling, solid surface, etc.). Absorbents and drip trays will be available; - Conditions of vehicles/equipment working on sites will be regularly checked. If damages and oil/fuel spills are observed, they will be repaired right away. No damaged equipment/vehicles will be admitted to worksites; - No discharge will be done into surface water bodies. Water will only be released to the surface if adequately clean (TPH 0.3 mg/l and TSS 30 mg/l). No water release on erosion prone areas and land used for agricultural purposes; - No littering; - Materials and waste will be stored so that they are protected from erosion and washout. Drainage ditches will be arranged on such storage locations to divert drainage water; - Slopes will be protected from erosion with vegetation cover (as per design); - Contractor personnel will be trained in environment protection and H&S issues.
Georgian EIA	Visual Impact	- Visual impact of construction works will be mitigated by adherence to work area and access road boundaries; maintaining vegetation cover; regular clean-up of work areas; timely removal of waste and control of material stockpiles (to avoid accumulation of excess material); - By using existing quarries, impact on landscape, loss of vegetation cover and need for new access roads will be eliminated; - Mitigation measures directed at soil, vegetation cover and waste management will be implemented; - Waste bins on the work areas will be covered to avoid wind scattering the waste; littering will be prohibited; Waste removal schedule from work areas will be complied with; - Re-cultivation plan will be developed and agreed. After completion of works, area will be cleaned, temporary structures dismantled, equipment removed and waste material disposed. After this re-cultivation activities will be carried out (as per plan mentioned above); - Noise barrier color and design will be selected to maximally fit into the existing environment.
Georgian EIA	Tree Cutting	As it is impossible to reinstate and maintain forest areas in their current form, prior to start of highway operation, submit offset or eco-compensation measures (equivalent forest habitat reinstatement plan) to the Ministry of Environment Protection and Agriculture that places special emphasis on red data species.

Clearance, Re-Vegetation and Restoration Management Plan

Source of Commitment	Topic	Commitment Text
Georgian EIA	Flora	On the pre-construction and construction stages, the following mitigation measures are planned to reduce impact on vegetation cover: - Strict adherence to boundaries of access roads, vehicle/equipment parking, construction camps (if applicable); - Prohibition of diverting from the approved routes; - Maintaining vegetation cover as much as possible; - Protection of protected species as per applicable regulations; - It is recommended to replace cut vegetation (especially protected species) with local new trees (as required), with aftercare of minimum 2 years. It is advisable to replant small diameter (<8cm) protected species outside the ROW (with follow up monitoring of condition); - Fencing of the critical root zone of the vegetation on the border of the ROW to ensure protection from works and equipment; - Waste Management - regular clean-up of the works areas, as per waste management requirements; - Re-cultivation of the impacted areas upon completion of construction; - Implementation of mitigation measures on soil and water; - Training of contractor personnel in environment protection and H&S issues including protection of the vegetation cover adjacent to project areas.
Georgian EIA	Fauna	In order to mitigate impact on fauna the following will be implemented: - Mitigation measures for impacts on vegetation, water and soil will be adhered to; - Usage of vehicle horns will be prohibited (except when absolutely necessary for safety purposes) to avoid disturbance of wildlife; - Tree cutting will be avoided during sensitive period for birds in spring-autumn (April-July); - No works will be carried out in the river beds or adjacent areas during fish spawning period (June-September); - In order to control potential impact, avoid it and in case of necessity define compensation measures, short term (construction phase) monitoring of aquatic and water dependent species will be carried out (no water dependent species were observed directly within the project impact area); - Excavations, trenches will be fenced to avoid animal fall/damage. For larger animals (cattle) bright colored tapes will be used, for smaller animals metal, plastic or other shields/fences. Despite this measure, after completion of shifts, wooden plans or brunches will be placed inside the excavations/trenches to enable smaller animals to escape. Trenches will be inspected prior to backfilling. - No hunting, poaching; - Train/instruct personnel in best construction practices including mitigation measures on fauna during construction

Clearance, Re-Vegetation and Restoration Management Plan

Source of Commitment	Topic	Commitment Text
		works.

2. CLEARANCE WORKS

2.1 Site Demarcation

Prior to start of any works on site, Contractor will ensure proper demarcation (staking) of the project boundaries, including intersections and areas under bridges (this excludes within rivers and tunnels, but not tunnel portals). The project footprint is approved by the Road Department. The boundaries are legal boundaries handed over to the Contractor. The demarcation of the boundary on site is responsibility of topography/survey team. The demarcation will be very clear in order to ensure that all staff understand the project impact zone very clearly. All works will be conducted inside the land allocated for the project and this will be clearly communicated to construction personnel through E&S induction as well as daily toolbox talks.

Contractor will apply same approach to all other land that will be acquired for project purposes including temporary access roads, batching plant sites, camps, borrow pits, stockpiling areas, spoil disposal sites or other territories temporarily used for construction purposes.

2.2 Tree Cutting

2.2.1 Tree Inventory and Permitting

Tree cutting is managed through different methods depending on the ownership of the land where trees are cut. There are three main types of landowners for tree cutting purposes: privately owned land, State Forest Fund land and state/municipality owned land. Red List species on any land are governed by same approach and require approval of Prime Minister through Governmental Decree for cutting that has to be facilitated by the Ministry of Environment Protection and Agriculture.

Trees (except for Red List species) on privately owned land only require payment of compensation to the affected tree owners as per the Project LARP.

For trees on State Forest Fund land, forest land usage rights and tree cutting permit acquisition are carried out in parallel. Forest land usage rights can be permanent, which require desilting of the land from the State Forest Fund or temporary, that require granting of special use rights. In either case tree cutting permit is acquired similarly. The process is managed by National Forestry Agency.

For trees on state/municipal lands National Property Management Agency under Ministry of Economy and Sustainable Development or Municipality are the entities that manage the process.

Initial step for permit acquisition from any entity is tree inventory. Trees with diameter at breast height (DBH) 8 cm and higher are subject to inventory. Inventory information included tree species, timber volume, location, coordinates and Forestry land details in case of State Forest Fund land. Tree Inventory on Forest Fund land has special forms that have to be completed. Inventory has to be done by qualified specialists in the area.

Tree cutting permit acquisition within land allocated for the project is responsibility of RD. The RD is responsible for inventory of the species as well. The RD shall also apply to the MEPA in writing regarding the identified Red-List species in the project area so that Governmental Decree is issued for their removal. As per ADB ESIA, a total of 7,232 trees have been identified in State Forest Fund areas. Of these, 204 are Georgian Red Listed species greater than 8cm in diameter and 431 are Georgian Red-listed species less than 8cm in diameter. The trees cut in these areas will need to follow the procedures as described below. Compensation payments for the tree cutting in State Forest Fund areas will be paid to the Government as follows:

- (i) User (RD) shall pay onetime payment for the use of forest land during implementation of land activities. The payment shall be paid according to Table 2 of Appendix 7 of The Resolution No.242 of Government of Georgia on Approval of Rules for Forest Use taking into account the area of used land.
- (ii) User (RD) shall pay compensation for cutting the trees according to the Table 1 of Appendix 7 of The Resolution No.242 of Government of Georgia on Approval of Rules for Forest Use.
- (iii) In case of cutting the red list trees the user (RD) shall pay compensation four times as great than the amount shown in the table 1 of Appendix 7 of The Resolution No.242 of Government of Georgia on Approval of Rules for Forest Use.
- (iv) The payment shall be made before beginning of forest usage.

No compensation in the form of re-planting is required under this resolution unless specified by the MEPA in the Approval of Environmental Decision. However, to ensure no net loss of habitat replanting, in addition to the compensation payments, is required by ADB EIA and by MEPA also and is discussed below.

2.2.2 Removal of Trees

Trees will be removed by Contractor as per requirements set out in tree cutting permits and applicable regulations. Trees will be removed mechanically without use of chemicals as required by ADB EIA. Cut trees will be properly preserved to ensure handover process is not impacted. For cutting of Red List species presence of representative of Forestry Agency may be required. Red List species will be stored separately from other species. Tree removal from steep slopes may be done by equipment due to safety concerns, but timber will be collected and preserved for handover.

As per requirements of biodiversity Action Plan Tree cutting shall not occur during bird nesting seasons, it is recommended to undertake the cutting during late autumn-winter period.

Although Pre-construction Ecological Survey confirmed that there are no active bat roosts or squirrel drays within project impact zone, prior to felling, trees will be checked for presence of active bat nests, bats in the hollows and squirrel drays. E&S Induction will provide sufficient information to workforce on how to act if they identify any of the above species. Any follow up actions in case of identification will be planned in consultation with the ecologist.

2.2.3 Handover of Timber

Timber cut during the tree removal process has to be handed over to the responsible authority, which in most cases is local branch of National Forestry Agency or can be Municipality for trees on State/Municipal land. Handover location is in most cases specified in the cutting permit.

The National Forest Agency provides free service for special marking and issuing timber origin certificate for transportation of timber resources. The timber resources obtained as a result of cutting of the trees from the State Forest Fund, shall be sorted out according per species by the Contractor and collected at the area indicated by National Forest Agency and handed over to the National Forest Agency by signing an official handover act.

Contractor will ensure cut trees are properly collected, managed and handed over. Volume of inventory and handover shall correspond to each other with allowable variation as defined by applicable regulation. Handover act is signed between the representatives of Contractor and entity receiving timber.

2.2.4 Survey of Georgian Red-list Species within 5-meter Buffer Zone

As noted above, inventory of trees within the land allocated for project purposes is RD responsibility. Contractor was responsible for inventory/marketing of trees protected by the Georgian Red List within a 5-meter buffer zone of the project corridor as per requirements of ADB EIA. All Georgian Red List trees having more than 8 cm diameter at breast height (DBH) were inventoried and marked. The purpose of the survey was to mark trees with number and DBH and record GPS coordinates of those individuals that do not fall within the boundaries of the project corridor and thus avoid unnecessary tree-cutting.

Table below summarized the inventory results. Complete inventory report is provided in **Annex 1**.

Table 2: Summary of the Inventoried Trees within 5 meter Buffer Zone

Species	Number of Inventoried Trees	Inventoried Trees within the 5-meter Buffer Zone of the Project Area	Inventoried Trees within the Project Area
All Trees	599	384	215
Georgian Red List Trees	597	384	213
Zelkova	413	295	118
Walnut	143	47	96
Chestnut	25	25	
Bladdernut	9	9	
Quercus Imeretina	7	7	
Betula	1	1	
Pterocarya	1		1
N/A	2		

As per ADB EIA commitment, protective wood fencing will be placed around the Georgian Red List species identified within 5 meters of the site boundary in order to protect the tree during construction works, including its root zones.

2.3 Topsoil Management

The issue of topsoil management is described in details in Contractor's Topsoil Stripping and Storage Plan. It can be briefly noted here that stripping will be preceded with topsoil depth survey. After the survey stripping will be undertaken as per relevant requirements. Topsoil storage will be arranged as close as possible to the areas where stripping was carried out depending on land availability. Topsoil stockpiles will be regularly maintained and special approach will be used for managing topsoil in sensitive locations (slopes and thin topsoil layer).

2.4 Subsoil Management

Contractor will assess alternative methods of excavation (blasting, boring and various mechanical methods) and make a selection for each project area that minimizes surplus excavated material as far as practicable. All material that is excavated shall be re-used to the maximum extent practicable, for example, by use of screening / crushing plant or as road subbase/fill material. Reuse is subject to review and approval by Engineer depending on the quality of the material.

Blasting will only be used in solid geological formation for tunnels 1 through 5. All blasting shall be in accordance with the vibration levels described in the Project environmental standards. Tunnel Blasting

Clearance, Re-Vegetation and Restoration Management Plan

Plans will be prepared accordingly. Contractor will conduct regular vibration monitoring as per Vibration Management Plan.

Estimates indicate that around 1,027,200 m³ of spoil material will be generated from the tunneling. Another 1,184,100 m³ of cut will be generated from excavation works on slopes, etc. Where practical the spoil will be re-used as embankment material at the Project site (for example on the embankments behind Zestaphoni). Approximately 1,519,800 m³ can be re-used as embankment material, which would leave approximately 691,500 m³ as static balance.

The creation of excess excavated material will be minimized as far as practicable. Excess material will be recovered and re-used to the greatest extent possible.

- 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 disposal sites shall be prohibited in areas of natural habitat.

Irrespective of the disposal location, disposal of waste soil and rock shall not adversely affect re-use of an area by landowners. For example, rock shall not be buried in agricultural land where this is inconsistent with pre-existing condition and land use agreements.

2.5 Temporary Erosion Control Works

Temporary erosion control measures to be installed and maintained by Contractor especially on steep slopes and all other work areas during construction in order to protect the environment in accordance with the requirements. Permanent anti erosion structures for slopes will be determined as per design.

The following general principles of erosion and sediment control, to be observed:

- Plan and integrate erosion and sediment control with construction activities.
- Minimize the extent and duration of disturbance.
- Divert or control stormwater flows onto, through and from the site.
- Minimize soil erosion.
- Stabilize disturbed areas progressively.
- Maximize sediment retention onsite.
- Maintain all erosion and sediment control measures in proper working order at all times.
- Inspect and maintain control measures.

The application of best practice erosion and sediment control is based upon the appropriate integration of three groups of control measures:

- Runoff control measures;
- Erosion control measures (including re-vegetation measures);
- Sediment control measures.

Wherever reasonable and practical, control measures from all three groups must be integrated in a total treatment system.

Temporary erosion control measures to be installed to maintain stability, minimize erosion and washout, and protect watercourses include:

- a) Diversion berms shall be constructed as needed on the steep slopes to control surface water runoff and erosion. Diversion berms shall be designed to simulate the slope contour and drain surface water away from the disturbed area;
- b) Where slopes require cutting, flumes shall be installed. These shall carry water from drainage sumps on the upslope;
- c) The work areas shall be monitored for:
 - Subsidence of excavations (below natural grade);

Clearance, Re-Vegetation and Restoration Management Plan

- Slope wash from improperly placed berms;
- Slumping and soil movements from cut and fill slopes;
- Loss of stored topsoil, subsoil or cuttings; and
- Off project-area disturbances.

If it is necessary to demobilize from any section due to the onset of winter weather, temporary erosion control measures required to stabilize the areas during the entire demobilization period will be installed where appropriate.

2.6 Spoil Disposal Sites

Spoil Disposal Plans for each individual spoil disposal site will provide detailed information, including pre-construction baseline. All details, including site selection and reinstatement will be in line with ADB and Georgian EIA requirements and applicable legislation.

2.7 Works at or Adjacent to Watercourses and Watercourse Crossings

Detailed Method of Working in the Water and Workplan will provide more details regarding management of construction activities in the watercourse crossings. Bridge Construction Plans will have site specific details.

Method will cover:

- Recording of the original channel width, depth and slope prior to disturbance to allow Reinstatement as near to the original as is practicable
- Re-contouring of banks to match surrounding slopes
- Installation of erosion protection measures at areas susceptible to washout or run-off as required by project design
- Replacement of the channel substrate
- Replacement of the bank Topsoil
- Re-seeding of the banks.
- Measures to minimise erosion and sedimentation through erosion control devices such as silt fencing.

The principles to minimise surface run off and reduce flash increase in flow rates in local surface water and drainage ditches should be applied to the construction areas.

The disturbed portion of the watercourse bed shall be returned to pre-construction contours where possible.

In addition to the works required to for bridge construction, there is a requirement to construct an access way across the watercourse to facilitate the movement of vehicles, plant and equipment across the river, and also to permit access for cranes to lift the construction material.

There are three different types of construction methodologies for access ways:

- Temporary bridge;
- Bridge with culverts;
- Fords.

In all cases, Contractor shall minimize compaction of soft and waterlogged ground to aid subsequent reinstatement.

Clearance, Re-Vegetation and Restoration Management Plan

Detailed Method of Working in the Water and Workplan will address construction through soft ground, which will include consideration of the use of load-bearing materials (e.g. bog mats, geotextile membranes or other) to support heavy loads in soft ground.

Temporary bridge with or without culverts

In this case, a 'bridge' would be constructed across the watercourse to provide vehicular access. It would consist of a pre-fabricated structure or two steel ramps with or without culverts.

Fords

A ford is a bed level crossing that is typically stabilized with mats or other materials. The banks are graded down to the ford to provide safe access for vehicles, however, there is minimal disturbance of the creek bed.

3. REINSTATEMENT (RESTORATION) WORKS

3.1 Reinstatement of Subsoil

As noted above project subsoil (spoil) will be re-used as embankment material. Subsoil and topsoil shall not be mixed with subsoil during placement.

Any imported soil will have similar physical characteristics to soil in the area where it will be deposited. The soil will be free from contaminants. After placement subsoil will be adequately (but not excessively) compacted to prevent future settlement. Subsoil beneath the running track will be ripped prior to reinstatement of agricultural land.

3.2 Reinstatement of Topsoil

Topsoil shall not be mixed with subsoil during replacement. Topsoil from unstripped / undisturbed areas shall not be used to cover disturbances.

Where original topsoil depth was less than or equal to 20 cm (as per project BOQ), Contractor shall provide any topsoil, or equivalent covering necessary to restore the original fertile depth. Make-up topsoil shall only be obtained from stockpiles of pre-excavated material and its use is subject to approval.

Where the original topsoil depth was more than 20 cm, Contractor shall restore to at least 20 cm.

Topsoil shall be replaced and harrowed to protect the stability of topsoil and to promote the re-growth of vegetation. On sites where harrowing is not practical (e.g. steep slopes, rocky areas, etc.), the sites should be dozer-tracked perpendicular to the slope or otherwise left with adequate roughness following topsoil placement.

Topsoil shall be replaced at locations furthest from each stockpile first, then successively working back to the stockpile; this is to minimize running over the re-instated soil.

Depending on the site-characteristics, the reinstated topsoil could be sown and / or covered with an erosion matting.

In agricultural areas, replaced topsoil shall be ready for re-seeding as agreed with Engineer and landowner. Any rocks brought to the surface shall be hand-picked and disposed of accordingly following completion of reinstatement in agricultural land parcels.

Clearance, Re-Vegetation and Restoration Management Plan

Spreading		
Construction of embankment		
Distribution of top soil on fill slope thickness 20 cm	m ³	42,200
Construction of dividing strip		
Distribution of top soil on dividing strip thickness 20 cm	m ³	5,770
Construction of berms for standard road signs		
Distribution of top soil on the surface and slopes of berms thickness 20 cm	m ³	4,980
SUM	m³	52,950

3.3 Slopes

Slopes will be restored as per Project design requirements. Different methods are applied to cut and fill slopes. For examples of cut and fill slopes refer to **Figure 1**.

Figure 1: Cut (light brown) and Fill (green) Slopes around Tunnel 4.0.02



Fill slopes will be covered with topsoil of thickness of 2 cm and seeded with perennial grass.

On cut slopes one of the 5 proposed slope protection measures will be applied following the additional geophysical investigations consisting of seismic refraction tests with a minimum 24 channel instrumentation and with a minimum distance between each geophone of 5 meters to confirm the hypothesis of the design regarding the inferred faults. For details regarding the stability analysis refer to Cut Slopes Analysis – Calculation Report (MA.SLO.4900.GE.GD-0001-3).

As noted, slope protection measures are divided into 5 types based on gradients, formations, unstable rock volumes etc. Those are summarized in **Table 3** below:

Table 3: 5 Typical Slope Protection Interventions

Protection Type	Characteristics
SP1	cut slope 3/5 on the PzGr and K1 formations with intermediate

Clearance, Re-Vegetation and Restoration Management Plan

Protection Type	Characteristics
Slope Protection type 1 J2b2A and J2b2B formations	horizontal plane - for outcrops that during the time of the works don't show any kind of unstable rock, no slope protection has to be adopted - for outcrops having unstable rock volumes up to 0.3m, rock slope stabilization/protection CASE 1-A have to be adopted - for outcrops having unstable rock volumes up to 0.5m, rock slope stabilization/protection CASE 1-B have to be adopted - for outcrops having unstable rock volumes up to 1.0m, rock slope stabilization/protection CASE 1-C have to be adopted - for outcrops having heavy jointed masses so that anchoring is not allowed in safety condition, rock fall protection CASE 2 have to be adopted - only if the water table is found out during the excavations coming from the rock at the bottom of the excavation, a drainage system at the toe of slope have to be installed, consisting of a raster 4 m x 4 m (quincuncial) draining pipe, 5° inclined, 10 m depth long (average length); the density of drainage (raster and depth) shall be calibrated in accordance with the real condition watched on site by mean of further field investigation - a drainage channel in correspondence of the higher berm has to be provided
SP2 Slope Protection type 2 N₁² formation	- The cut slope have to be not greater than 45° - For outcrops that during the time of the works don't show any kind of unstable rock, no slope protection has to be adopted - For outcrops having unstable rock volumes up to 0.3m, rock slope stabilization/protection CASE 1-A have to be adopted - For outcrops having unstable rock volumes up to 0.5m, rock slope stabilization/protection CASE 1-B have to be adopted - For outcrops having unstable rock volumes up to 1.0m, rock slope stabilization/protection CASE 1-C have to be adopted - For outcrops having heavy jointed masses so that anchoring is not allowed in safety condition, rock fall protection CASE 2 have to be adopted - A drainage system at the toe of slope have to be necessarily installed, consisting of a raster 4 m x 4 m (quincuncial) draining pipe, 5° inclined, 10 m depth long (average length); the density of drainage (raster and depth) shall be calibrated in accordance with the real condition watched on site by mean of further field investigation - a drainage channel in correspondence of the higher berm has to be provided
SP3 Slope Protection type 3 J2b2A and J2b2B formations with covering layer of gS-sG	- cut slope 3/5 on the PzGr with intermediate horizontal plane and a 35° laying on the covering layer of gS-sG with intermediate horizontal plane - for outcrops that during the time of the works don't show any kind of unstable rock, no slope protection has to be adopted - for outcrops having unstable rock volumes up to 0.3m, rock slope stabilization/protection CASE 1-A have to be adopted - for outcrops having unstable rock volumes up to 0.5m, rock slope stabilization/protection CASE 1-B have to be adopted - for outcrops having unstable rock volumes up to 1.0m, rock slope stabilization/protection CASE 1-C have to be adopted - for outcrops having heavy jointed masses so that anchoring is not allowed in safety condition, rock fall protection CASE 2 have to be

Clearance, Re-Vegetation and Restoration Management Plan

Protection Type	Characteristics
	adopted - only if the water table is found out during the excavations coming from the rock at the bottom of the excavation, a drainage system at the toe of slope have to be installed, consisting of a raster 4 m x 4 m (quincuncial) draining pipe, 5° inclined, 10 m depth long (average length); the density of drainage (raster and depth) shall be calibrated in accordance with the real condition watched on site by mean of further field investigation - a drainage channel in correspondence of the higher berm has to be provided
SP4 Slope Protection type 4 N₁² formation with covering layer of sC	- cut slope not greater than 45° and a 30° laying on the covering layer of sC with soil nailing intervention, with a raster 1.5 m x 1.5 m of anchor 250 kN working load, inclination 10°, 6 m long (average length), and reinforced geocomposite layer, vegetal hydro seeding layer, water drainage - for outcrops that during the time of the works don't show any kind of unstable rock, no slope protection has to be adopted - for outcrops having unstable rock volumes up to 0.3m, rock slope stabilization/protection CASE 1-A have to be adopted - for outcrops having unstable rock volumes up to 0.5m, rock slope stabilization/protection CASE 1-B have to be adopted - for outcrops having unstable rock volumes up to 1.0m, rock slope stabilization/protection CASE 1-C have to be adopted - for outcrops having heavy jointed masses so that anchoring is not allowed in safety condition, rock fall protection CASE 2 have to be adopted - only if the water table is found out during the excavations coming from the rock at the bottom of the excavation, a drainage system at the toe of slope have to be installed, consisting of a raster 4 m x 4 m (quincuncial) draining pipe, 5° inclined, 10 m depth long (average length); the density of drainage (raster and depth) shall be calibrated in accordance with the real condition watched on site by mean of further field investigation - a drainage channel in correspondence of the higher berm has to be provided
SP5 Slope Protection type 5 N₁² formation with covering layer of sC	- cut slope not greater than 45° and a 30° laying on the covering layer of sC with soil nailing intervention, with a raster 1.5 m x 1.5 m of anchor 250 kN working load, inclination 10°, 9 m long for the top anchors and 6 m long for the bottom anchors, and 25cm thick sprayed concrete with double steel mesh, water drainage - for outcrops that during the time of the works don't show any kind of unstable rock, no slope protection has to be adopted - for outcrops having unstable rock volumes up to 0.3m, rock slope stabilization/protection CASE 1-A have to be adopted - for outcrops having unstable rock volumes up to 0.5m, rock slope stabilization/protection CASE 1-B have to be adopted - for outcrops having unstable rock volumes up to 1.0m, rock slope stabilization/protection CASE 1-C have to be adopted - for outcrops having heavy jointed masses so that anchoring is not allowed in safety condition, rock fall protection CASE 2 have to be adopted - only if the water table is found out during the excavations coming from the rock at the bottom of the excavation, a drainage system at

Clearance, Re-Vegetation and Restoration Management Plan

Protection Type	Characteristics
	the toe of slope have to be installed, consisting of a raster 4 m x 4 m (quincuncial) draining pipe, 5° inclined, 10 m depth long (average length); the density of drainage (raster and depth) shall be calibrated in accordance with the real condition watched on site by mean of further field investigation • a drainage channel in correspondence of the higher berm has to be provided

Annex 2 provides typical drawings per each Slope Protection Type.

Figures 2 to 5 provide example photos for Cases 1- A, B, C and Case 2 for unstable rock protection.

Figure 2: Example of Rock Slope CASE 1-A



Figure 3: Example of Rock Slope CASE 1-B



Figure 4: Example of Rock Slope CASE 1-C



Figure 5: Example of Rock Slope CASE 2



3.4 Watercourses Crossing

Due to the nature of bridge structures, no massive river bank and/or bed stabilization measures are required after completion of construction. Most attention will be directed towards construction period to ensure construction works as well as any structures/land within the project impact are not adversely affected. Those measures are summarized in the section 2.7 above.

The purpose of civil protection works at river crossings is to control the active zone of river movement, thereby protecting the installed pillars(s). For this purpose, at Bridges BRI (AT/TA) 4.1.01, 4.1.02 and 4.1.03 on rivers Dzirula (x2) and Kvirila stone rip raps will be arranged on top of pier plinth.

3.5 Temporary Facilities (Camps, Works Areas, Batching Plants, Laydown Areas, Spoil Disposal Sites)

Construction support facilities including camps, work areas, batching plants, laydown areas and spoil disposal sites will be reinstated as per land use requirements/plans. There are site specific plans for majority of the above facilities like camp, batching plants and spoil disposal sites that provide information on related reinstatement commitments. Any agricultural land will be reinstated to pre-construction condition. Reinstatement of additional non-agricultural land acquired by the Contractor for construction purposes is subject of agreement between the Contractor and landowner. RD acquired land will be reinstated as per RD/Engineer direction. In all cases LARP requirements will apply to ensure landowner rights are not adversely affected.

General approach to reinstatement will be as follows. Contractor will remove all aboveground and underground infrastructure and utilities placed temporarily for construction purposes, and reinstate the areas to near original condition. Contractor shall ensure that there shall be no encroachment onto adjacent land throughout the duration of the work. Temporary facilities/works shall be designed so that they can be removed completely (including all underground infrastructure), unless otherwise agreed between Contractor, landowner and Engineer/RD.

Temporary facility removal shall commence as soon as possible when it is no longer required to support construction. Reinstatement of the land shall commence immediately on removal of each individual facility. This is to ensure that misuse, degradation or erosion of the land does not occur. The support facilities shall be reinstated to near original condition including topography; soil characteristics and vegetation cover and composition. Contractor shall permanently reinstate the area as agreed with the owner/authority to their satisfaction.

4. RE-VEGETATION AND BIORESTORATION

4.1 Seeding

The long-term objectives of seeding are to restore variety and distribution pattern of the original plant species with the long-term objective of restoring the local ecology. The short-term objectives are to provide a rapid vegetative cover to achieve erosion control, to assist longer term objectives.

Seeding is mandatory for sections provided in **Table 4** below. Anyway, on all areas designated as non-agricultural, seeding can be carried out wherever it is likely to be required for achieving the objective of erosion control and the near-term reinstatement targets including vegetation cover.

Table 4: Seeding Locations

Seeding		
Seeding of perennial grass, watering and further treatment		
Seeding of perennial grass on fill slopes, in the dividing strip and on berms for standard road signs	m ²	264,750
Seeding of perennial grass on interchange roundabouts, interchange 1	m ²	1,380
Seeding of perennial grass on interchange roundabouts, interchange 2	m ²	690
Seeding of perennial grass on interchange roundabouts, interchange 3	m ²	1,380
Seeding of perennial grass on interchange roundabouts, interchange 4	m ²	690

Further areas / route sections where seeding has to be executed for achieving the targets of biorestore of the sensitive habitats may be indicated by Engineer/RD.

At temporary facility sites, the need for seeding during the reinstatement will be determined as agreed with the Engineer.

The following has to be considered when implementing seeding:

- Type of seed mix to be used for achieving the erosion performance targets and the long-term objectives of biorestore;
- Checking for alien and / or invasive species;
- Seed bed preparation measures;
- Appropriate sowing season;
- Seeding rates;
- Seeding methods (such as broadcast or hydroseeding methods);
- Soil additives selection and use;
- Watering requirements;
- Seeding schedule (allowing for growing season and site-specific meteorological conditions);
- Seed protection measures.

Contractor shall be responsible for procurement of commercially available seeds and the execution of all the seeding.

4.2 Red List Species Planting

As noted in the Tree Cutting Section above, although not explicitly required by Georgian legislation, compensation planting may be requested by MEPA or by International Banks funding the project.

In this particular case, both MEPA through their Environmental Decision approval condition and ABD EIA require offset planting to ensure no net loss to the affected habitats. For detailed wording of the commitments/requirements refer to the **Table 1** above.

4.2.1 Overview of Affected Tree Species

Project impact on tree species can be broadly subdivided into two main parts: first section up to Interchange 1 PK33 and section from PK33 till the end (Argveta). First section impacts Forest Fund land between PK0-PK12 portals and connections between BRI 4.0.01 and BRI 4.0.02 and PK17-PK24 around BRI 4.1.02 used for two internal roads construction. This is a relatively well-preserved forest habitat of high

Clearance, Re-Vegetation and Restoration Management Plan

conservation value due to ecological function and occurrence of GRL tree species – Zelkova (*Zelkova carpinifolia*), Chestnut (*Castanea sativa*), Bladder nut (*Staphylea colchica*) and individuals of Yew (*Taxus baccata*) and Circassian walnut (*Juglans regia*). It should be noted that by the time of construction, monetary compensation will already been paid by RD for GRL trees, fulfilling legal requirements of applicable Governmental Decrees.

Tree species on the second section are more fragmented and mostly grow in roadside plantations and as solitary individuals. Undersized and coppiced plants found along the roads and between agricultural fields do not form continuous ecological corridor or habitat as they are under significant anthropological pressure. Solitary specimens scattered along the road have low ecological function and are mostly represented by common, cultivated, non-native and invasive species. Existing roadside plantations are degraded due to poor management practices and increasing man-induced disturbance; they are largely composed of non-native species. Therefore, they have low conservation value and limited ecological functionality. It should however be noted that there are sections where Red List Tree Inventory within the 5-meter buffer zone identified large number of Zelkovas (*Zelkova carpinifolia*) specially after the river Kvirila crossing Internal road near portal of TUN 4.0.04. For details refer to **Annex 2**. Those trees will be preserved as per relevant commitment.

Tree species to be removed on Forest Fund land are summarized in **Table 5** below.

Table 5: Inventory of Trees to be Cut on Forest Fund Land (Appendix G ADB EIA)

Species	Number of Inventoried Trees (>8 cm)	Number of Inventoried Trees (<8 cm)	Red List Species
Zelkova (<i>Zelkova carpinifolia</i>)	77	159	Y
Acacia (<i>Acacia dealbata</i>)	440	210	
Ashtree (<i>Fraxinus excelsior</i>)	6	15	
Alder (<i>Alnus barbata</i>)	79	n/a	
Willow (<i>Salix magnifica</i>)	30	n/a	
Oriental Hornbeam (<i>Carpinus orientalis</i>)	114	630	
Georgian Oak (<i>Quercus iberica</i>)	11	20	
Crab Apple (<i>Malus sylvestris</i>)	2	5	
Hazel (<i>Corylus avellana</i>)	50	1550	
Common Pear (<i>Pyrus communis</i>)	6	n/a	
Hornbeam (<i>Carpinus caucasica</i>)	137	25	
Chestnut (<i>Castanea sativa</i>)	85	22	Y
Lime (<i>Tilia caucasica</i>)	32	n/a	
Maple (<i>Acer</i>)	9	12	
Taller Ash (<i>Fraxinus excelsior</i>)	31	n/a	
Bladder nut (<i>Staphylea colchica</i>)	38	250	Y
Yew (<i>Taxus baccata</i>)	1	n/a	Y
Wild plum (<i>Prunus insititia</i>)	10	10	
Harthorn (<i>Crataegus microphylla</i>)	10	375	
Cedar (<i>Cedrus deodara</i>)	121	n/a	
Tree of heaven (<i>Ailanthus altissima</i>)	54	80	
Elm (<i>Ulmus foliacea</i>)	13	51	
Circassian walnut (<i>Juglans regia</i>)	3	n/a	Y
Fig (<i>Ficus carica</i>)	4	7	
Honey-locust (<i>Gleditschia caspica</i>)	2	n/a	
Mulberry (<i>Morus alba</i>)	13	41	
Asp (<i>Populus alba</i>)	1	n/a	
Persimmon (<i>Diospyros kaki</i>)	49	13	
Holly (<i>Ilex</i>)	n/a	22	
Blackberry (<i>Rubus</i>)	n/a	900	
Pine (<i>Pinus</i>)	n/a	2	
Wild Cherry (<i>Prunus avium</i>)	n/a	5	

Clearance, Re-Vegetation and Restoration Management Plan

Species	Number of Inventoried Trees (>8 cm)	Number of Inventoried Trees (<8 cm)	Red List Species
Cornel (Plural cornels)	n/a	135	
Laurel Cherry (<i>Prunus laurocerasus</i>)	n/a	50	
Winterberry (<i>Llex verticillate</i>)	n/a	55	
Greenbrier (<i>Smilax rotundifolia</i>)	n/a	1160	
Total	1428	5804	635

There may be need for removal of more trees on Additional Land acquired by Contractor to support construction activities. This section only focuses on re-planting and restoration scope of 635 GRL species inventoried on Forest Fund land as per Appendix G of ABD EIA (as summarized in **Table 5** above). Any addition to the scope is subject to agreement between Contractor and Engineer/RD.

4.2.2 Compensation Planting Approach

Compensation planting locations haven't been determined yet. ADB's EIA requires restoration / re-planting of total of 14.9 hectares to compensate loss of trees/habitats for project purposes. Contractor is responsible for planting and maintenance of trees and shrubs in accordance with this Plan during the construction and defects liability period of the Project.

Locations will be selected following the negotiations with National Forestry Agency and RD. General approach to compensations has been allocations of land within the Forestry areas that have been somewhat degraded due to natural causes or illegal logging and remediating/restoring those. Those locations can be found around the cutting sites at TUN 4.0.01 or TUN 4.0.02 on both sides of river Dzirula. An example of potential planting site on the rights side of the river Dzirula close of portal of TUN 4.0.02 can be found on **Figure 6**.

Figure 6: Example of Planting Location close to TUN 4.0.02 (Forestry land inside green contours; proposed plating location in red)



Clearance, Re-Vegetation and Restoration Management Plan

As detailed in **Table 5** above, a number of GRL species inventoried for removal is 635. Rare, endemic species replanting ratio is generally 1:5 meaning that 3,175 saplings have to be planted. Planting ratio will be further agreed as part of scope/location agreement after consultations with RD/Forestry Agency.

Inventoried Species	Status	Planting Ratio	Proposed Number of Saplings
Zelkova (Zelkova carpinifolia)	Red List	1:5	1180
Chestnut (Castanea sativa)	Red List	1:5	535
Bladder nut (Staphylea colchica)	Red List	1:5	1440
Yew (Taxus baccata)	Red List	1:5	5
Circassian walnut (Juglans regia)	Red List	1:5	15

Trees have to be acquired in local nurseries. Detailed planting and aftercare/maintenance plan will be developed in coordination with Forestry Agency/RD.

4.3 Planting of Shrubs on Dividing Strip

Contractor is also responsible for planting of the shrubs on the dividing strip between the highway lanes. Area to be covered with shrubs is approximately 28,850 m². Shrub species will be selected based on consultation with the Engineer/RD. Shrubs will be watered regularly to ensure survival success.

5. MAINTENANCE AND MONITORING

Contractor shall maintain the standard of reinstatement, taking all corrective action as necessary to ensure that the erosion protection and vegetative cover restoration takes place.

To achieve the vegetation cover restoration and the near-term outcomes of the biorecovery strategy, works will be monitored and aftercare provided for the entire duration of the defect liability period as per Contract.

If success rate of GRL tree survival planted for the purposes of habitat restoration is below 80%, Contractor will replace dead trees with the ratio of 1:1.

ANNEX 1: RED LIST TREE SURVEY (WITHIN 5 METER BUFFER ZONE)



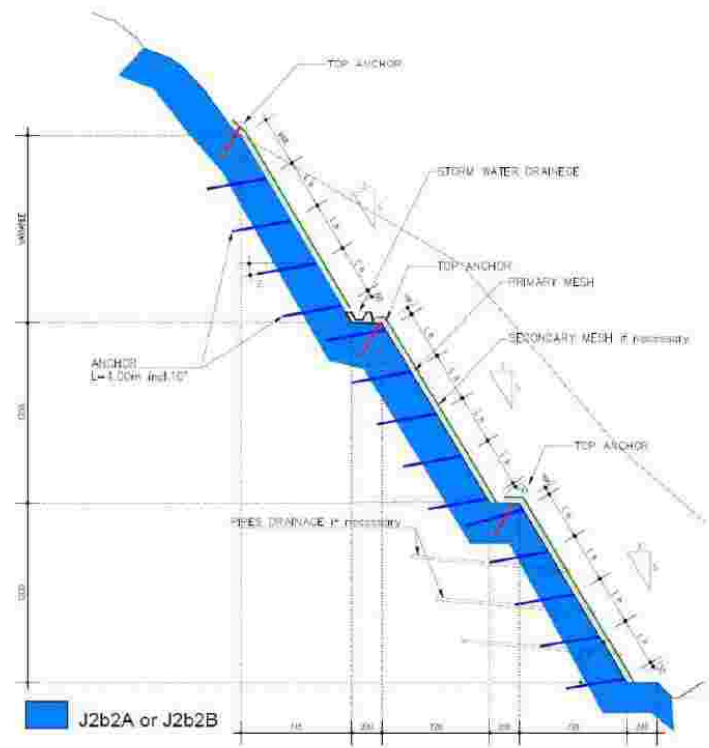
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Red List Tree
Inventory Maps.pdf

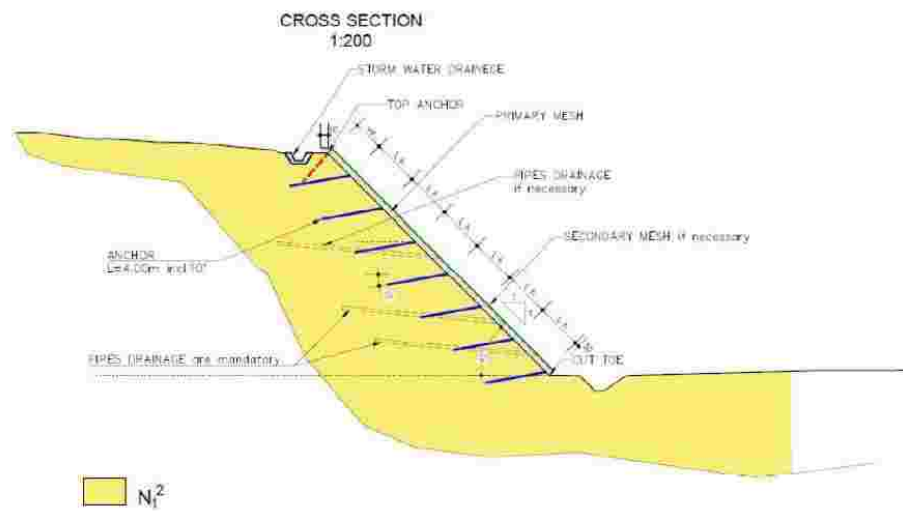
ANNEX 2: TYPICAL SLOPE PROTECTION DRAWINGS

Typical Slope Protection Drawing for SP1

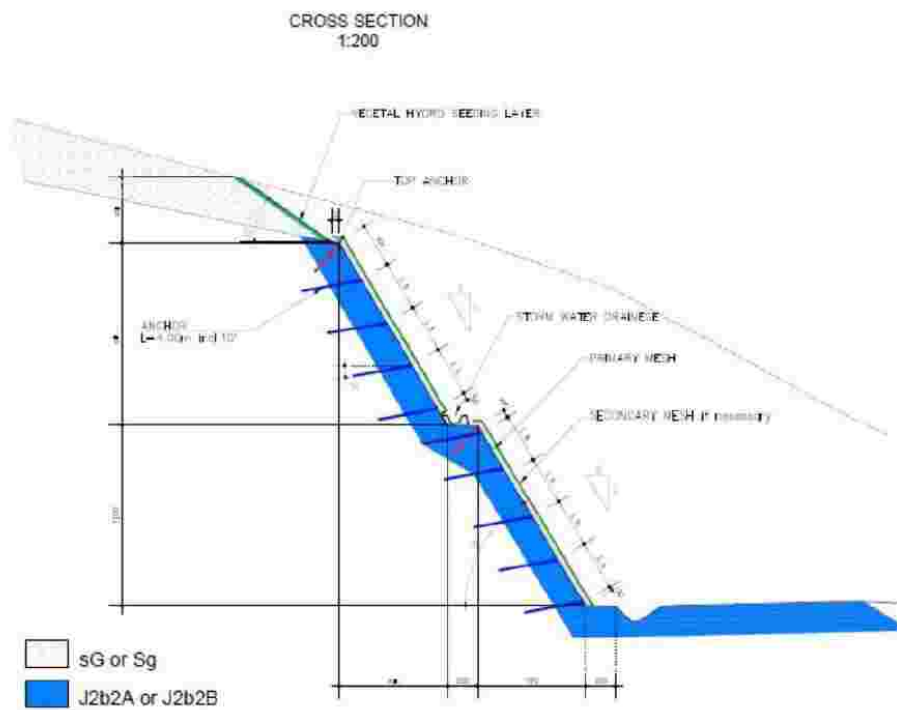


Typical Slope Protection Drawing for SP2

Clearance, Re-Vegetation and Restoration Management Plan

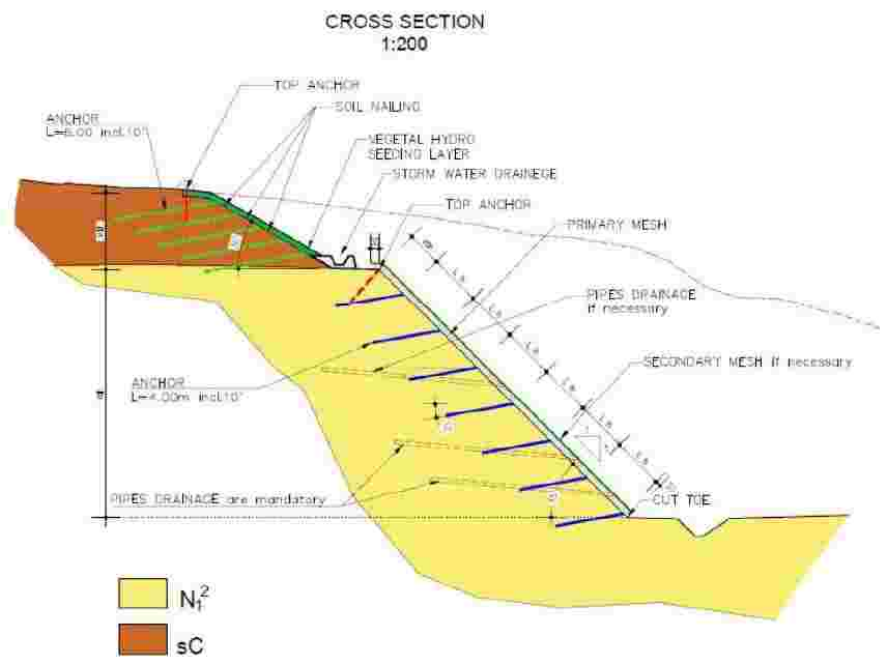


Typical Slope Protection Drawing for SP3

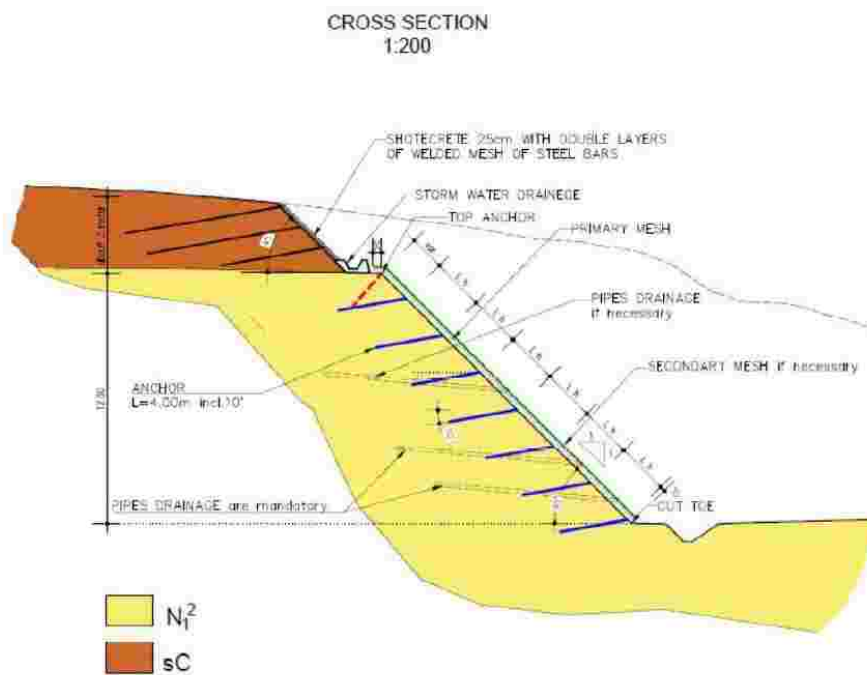


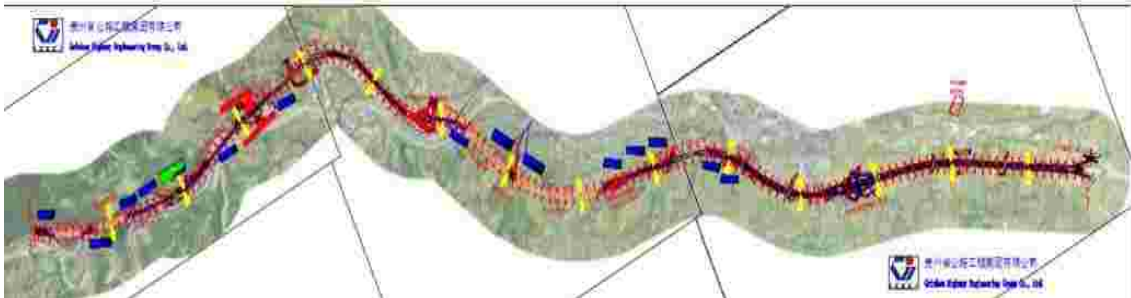
Typical Slope Protection Drawing for SP4

Clearance, Re-Vegetation and Restoration Management Plan



Typical Slope Protection Drawing for SP5



SHORAPANI-ARGVETA Section (E60 highway route) F4 section plan  Shorapani-Argveta F4 Section	
  ROADS DEPARTMENT OF GEORGIA საგზაო დეპარტამენტი	Road department of Georgia of The Ministry of Regional Development and Infrastructure of Georgia
 UBM ULUSLARARASI BİRLEŞMİŞ MÜŞAVİRLİK HİZMETLERİ A.Ş. Construction Supervision Consultant for E60 Highway F4 Shorapani-Argveta Project	Engineer: UBM Uluslararası Birleşmiş Müşavirler Müşavirlik Hizmetleri A.Ş. (Turkey)
 	Contractor: Guizhou Highway Engineering Group Co. & China National Technical Import and Export Corporation Joint venture
CONSTRUCTION OF SHORAPANI-ARGVETA SECTION (E60 HIGHWAY ROUTE) LOT F4 Contract No. SARP/CW/OCB-01 Tree Compensation Planting Plan F4 Section (Kveda Tseva-Argveta) - Khevi-Ubisa-Shorapani-Argveta, E60 EWH	
Prepared by: Guizhou Highway Engineering Group Co. & China National Technical Import and Export Corporation Joint venture	
Reviewed by: Chen Yuqiang, Contractor's Representative	
Submitted for: Approval	

Prepared by

SDSC LLC

Tbilisi 2023

Table of Contents

1. INTRODUCTION	7
1.1 Preamble.....	7
1.2 Headline Information.....	7
2. PROJECT DESCRIPTION AND CURRENT ACTIVITIES	8
2.1 Project Description.....	8
2.2 Project Contracts and Management	9
2.3 Project Activities during Current Reporting Period.....	12
2.4 Information on Personnel Working at Construction Site.....	14
2.5 Description of any Changes to Project Design	16
2.6 Description of Any Changes to Agreed Construction Methods.....	16
3. ENVIRONMENT SAFEGUARD ACTIVITIES.....	17
3.1 General Description of Environment Safeguards Activities	17
3.2 Site Audits	17
3.3. Issues Tracking.....	19
3.4 Trends	23
3.5 Unanticipated Impacts or Risk	24
4. RESULTS OF ENVIRONMENTAL MONITORING	25
4.1 Overview of the Monitoring Conducted During Current Period	25
4.2 Summary of Monitoring Outcomes	35
4.3 Material Resource Mobilization	Error! Bookmark not defined.
4.4 Waste Management.....	36
4.5 Spoil Disposal	37
4.6 Health and Safety.....	37
4.6.1 Community Health and Safety	38
4.6.2 Occupational Health and Safety	38
4.7 Training.....	38
4.8 Social Management and Grievance Redress Mechanism	39
5. FUNCTIONING OF SSEMP	39
5.1 SSEMP Review	39
6. GOOD PRACTICES.....	40
6.1 Good Practices.....	40
7. SUMMARY AND RECOMMENDATION	41
7.1 Summary	41
7.2 Recommendations & Follow-up Actions for the next Monitoring Period.....	41
ANNEXES	43
Annex 1: Project Photo log during Monitoring Period.....	43

Annex 2: Latest HS&E Inspection Report (December 2023).....	50
Annex 3: Latest Water, Ambient Air Quality, Noise, and Vibration Monitoring Report (December 2023) ..	64
Annex 4: Sample Attendance Sheet	102
Annex 5: Complaints Log for Reporting Period.....	Error! Bookmark not defined.
Annex 6: Clearance, Re-vegetation and Restoration Management Plan & Tree Compensation Plan.....	108
1. INTRODUCTION.....	141
1.1 Project Overview	141
1.2 Abbreviations	142
1.3 Purpose and Objectives of the Document	142
2. DETAILED DESCRIPTION OF PROPOSED COMPENSATION PLANTING LOCATIONS	143
2.1 Vegetation Cover and Habitats	143
2.2 Affected Tree Species	145
2.3 General Description of Compensation Planting Locations.....	146
2.4 Natural Conditions of the Planting Locations	147
2.4.1 Climate	147
2.4.2 Soils.....	148
3. Compensation Planting Approach	148
3.1 Basic Principles	148
3.2 Replacement Species	148
3.2.1 Zelkova	149
3.2.2 Chestnut	150
3.2.3 Walnut.....	151
4. Scope of Activities and Works.....	151
4.1 Saplings.....	151
4.2 Zelkova Propagation from Seeds (Alternative Option)	152
4.3 Planting Specifications	153
5. Pest Control Measures.....	155
6. Aftercare.....	157
7. Monitoring	158
8. Cartographic Material	158
9. Cost Estimate.....	174
Annex 1: Decrees of the Government of Georgia On Removal of Red List Species from Natural Environment	175
Decree N1328	175
Decree N2095	178

1. INTRODUCTION

1.1 Project Overview

The East–West Highway (EWH) Improvement Project involves construction of a new road section of the E-60 highway located in Imereti Region of central Georgia. Section F4 forms the Shoropani-Argveta (Kveda Tseva-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.

The Project runs through variety of terrains, starting from mountains to river valleys and plains.

The Project includes construction of 6 long span bridges and 1 short span bridge. The total length of the seven bridges is 4987.89 meters; the longest of which is 893.3 meters.

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

There are four interchanges planned in F4 Section.

The following types of culverts will be constructed:

- Underpasses for rural roads;
- Cattle passes, which ensure cattle cross the Project road;
- Culverts to provide water discharge from ravines and canals.

Two different pavement structures will be used:

- Concrete pavement structure for the motorway and interchanges; and
- Asphalt pavement structure for all Slip Roads and all Minor Roads and bridges.

The Project is financed by the Asian Development Bank (ADB).

The Roads Department (RD) of the Ministry of Regional Development and Infrastructure of Georgia (MRDI) is wholly responsible for the implementation of the Project.

RD has selected an Engineer (Works Supervisor) a JV between international engineering/construction companies UBM Uluslararası Birleşmiş Müşavirler Müşavirlik Hizmetleri A.Ş. (Turkey) and SMEC International PTY LTD (Australia).

Construction Contractor is Guizhou Highway Engineering Group Co.

1.2 Abbreviations

ADB	–	Asian Development Bank
EIA	–	Environmental Impact Assessment
EUNIS	–	European Nature Information System
GRL	–	Georgia Red List
Ha	–	Hectare
KP	–	Kilometer point (1 km section of the road)
MEPA	–	Ministry of Environment Protection and Agriculture

1.3 Purpose and Objectives of the Document

Legal basis for the present plan is Governmental Decree N383 dated July 27, 2021 on approval of Rules for Forest Protection, Reinstatement and Care.

As per Article 18 Section 5, natural as well as artificial forests that have been affected by forest fires and also forests destroyed and degraded by other reasons.

In this case current plan has been developed to reinstate-develop degraded forest sections/plant on project affected land to compensate red list species cut for the construction of E60 Kveda Tseva-Argveta section (F4) (Zestafoni Municipality)

As noted above, the F4 section of the road is located in Imereti Region and runs through variety of terrains. The corridor in general, crosses mostly agricultural/industrial/urban land parcels. Habitats are significantly altered. Vegetation is highly modified, because the land has been cultivated using the agricultural equipment. At certain areas, where agricultural activities have been suspended, secondary vegetation is developed. The territory is also extensively used for grazing purposes. The fragments of natural vegetation, which alternates with the artificial groves, is sandwiched between the agricultural land parcels. Therefore, road construction has limited impact on natural habitats, however, there are some sections, especially in the beginning of the corridor around the Tunnels 1 and 2, that are forest areas and will require tree cutting for the purposes of tunnel construction. All trees to be cut for Project purposes have been inventoried and relevant permits have been obtained for their cutting. Decree of the Prime Minister of Georgia has been obtained for cutting of the Georgian Red List species as per legal requirements.

The purpose of this document is to set out compensation planting approach for Georgia Red List woody

species to provide adequate mitigation for the loss of woody plants due to road construction and fulfil EIA commitment/approval condition summarized in **Table 1** below.

The present plan, therefore focuses on off-set planting of Georgian Red List trees removed from natural environment.

Table #1: Georgian EIA Approval Conditions 3.9

Source of Commitment	Topic	Commitment Text
Order N2-181 of the Minister of Environment Protection and Agriculture on Approval of Environmental Decision (3.9)	Tree cutting	As it is impossible to reinstate and maintain forest areas in their current form, prior to start of highway operation, submit offset or eco-compensation measures (equivalent forest habitat reinstatement plan) to the Ministry of Environment Protection and Agriculture that places special emphasis on red data species.

2. DETAILED DESCRIPTION OF PROPOSED COMPENSATION PLANTING LOCATIONS

2.1 Vegetation Cover and Habitats

Pre-construction habitat survey conducted in the Project corridor prior to start of construction activities revealed that in total, 101.21 ha of area is under the impact zone of Project corridor, of which the major part represents agricultural land (approximately 67 ha.), artificial landscape, existing roads and railway, etc. Accordingly, the mentioned areas do not represent natural habitats and in terms of biodiversity, do not belong to important areas.

As for other type of habitats, forest habitats are established on the area, river gorge vegetation habitats as well as floodplain habitats and forest groves. Most of the mentioned habitats are significantly changed, but fragments are present, which are more or less maintained with natural conditions, despite the close vicinity of infrastructure and population. These fragments are located in ravines and in the vicinity of rivers or on steep slopes.

Detailed information about the studied habitats is summarized in the Table 2 below:

Table 2: Existing Habitats in Construction Corridor as per EUNIS Classification

#	Type of Habitat	Code	Area of Habitat, Ha
1.	Agricultural land, urban and secondary landscape		66,59
2.	Areas occupied by existing infrastructure		1,79
3.	Artificial landscapes		7,79
4.	Forest of Quercus - Fraxinus - Carpinus betulus, on eutrophic and mesotrophic soils	G1.A1	13,44
5.	Forest of ravines and slopes	G1.A4	4,69
6.	Low and medium altitude meadows	E2.2	1,35
7.	Pebble river bank vegetation	C3.55	3,41
8.	Vascular plant community divided from pebble river bank vegetation	C 3,62	1,08
9.	Forest of Fraxinus – Alnus on river embankment, which is watered only, when water level rises	G1.21	1,07
	Total area under impact		101,21

As the table demonstrates, 70% of the total area is under anthropogenic pressure, and the rest 30% is represented by forest groves.

As noted, habitats of higher conservation value exist in patches and are mostly present in the first half of the road section starting from Tseva. The second half, mostly goes through the urban, sub-urban and agricultural locations as demonstrated by Figures 1, 2 and 3 below.

Figure 1: Project Habitat Map KP0-KP1.8



Figure 2: Project Habitat Map KP1.5-KP3

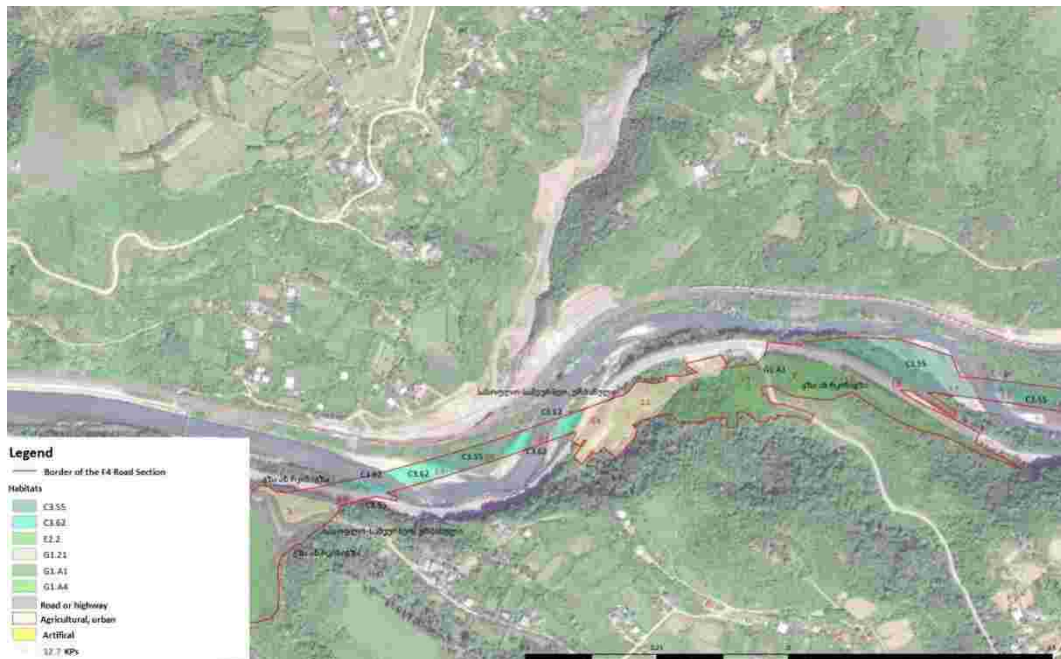


Figure 3: Project Habitat Map KP10.2-KP12.5



2.2 Affected Tree Species

Project impact on tree species can be broadly subdivided into two main parts: first section up to Interchange 1 KP3.3 and section from KP3.3 till the end (Argveta). First section impacts Forest Fund land between KP0-PK1.2 portals and connections between Bridge N1 and Bridge N2 and KP1.7-KP2.4 around Bridge N2 used for two internal roads construction. This is a relatively well-preserved forest habitat of high conservation value due to ecological function and occurrence of GRL tree species – Zelkova (*Zelkova carpinifolia*), Chestnut (*Castanea sativa*) and Walnut (*Juglans regia* L.). It should be noted that, monetary compensation has already been paid by RD for GRL trees, fulfilling legal requirements of applicable Governmental Decrees.

Tree species on the second section are more fragmented and mostly grow in roadside plantations and as solitary individuals. Undersized and coppiced plants found along the roads and between agricultural fields do not form continuous ecological corridor or habitat as they are under significant anthropological pressure. Solitary specimens scattered along the road have low ecological function and are mostly represented by common, cultivated, non-native and invasive species. Existing roadside plantations are degraded due to poor management practices and increasing man-induced disturbance; they are largely composed of non-native species. Therefore, they have low conservation value and limited ecological functionality.

GRL tree species to be removed as per governmental decrees (see **Annex 1**) are summarized in **Table 3** below. There is a plan to remove additional 42 red list species - Zelkova, for which relevant documentation has been submitted for the administrative proceedings. No GRL trees will be removed until relevant permission is granted through Governmental decrees.

Table 3: GRL Trees to be Cut under Governmental Decrees

Species	Status	>8 cm	<8 cm
Zelkova (<i>Zelkova carpinifolia</i>)	Red List	237	-
Chestnut (<i>Castanea sativa</i> Mill)	Red List	1	-
Walnut (<i>Juglans regia</i> L.)	Red List	9	20

There were also non-GRL species removed for the proposed of highway construction, but the plan focuses on compensation planting of GRL species only due to their increasingly high value to local biodiversity and ecosystems.

2.3 General Description of Compensation Planting Locations

For the selection of the sites both ecological and socio-economic aspects were considered.

It is general knowledge that restoration efforts should be undertaken only in areas which were formerly covered by forest. If possible, the site should be situated in close proximity to already existing forest systems: this will enhance the likelihood of long-term success and sustainability of the endeavor. Isolated sites face greater threats from hazardous events – such as droughts – because there is little or no existing buffer capacity in the surrounding environment for natural recolonization. It is recommended to plan the planting activities in accordance with the selected topography, ensuring trees planted on slopes are adequately protected from erosion to ensure the new plants are not affected by heavy rainfalls before they develop strong enough root systems.

Planting sites which enhance the protection of both soils and water resources can generate important economic benefits within the sites and for the surrounding communities. It may also be desirable to select areas where the restoration measures can enhance the status of an already endangered habitat type.

Traditional/informal land use, such as livestock grazing, were taken into consideration when proposing the planting site. Given the limited land availability in the mountainous area close to the start of the road section, preference was given to restoring already degraded forest patches with no signs of grazing. This lowers the risk of conflicts with other land use options (such as livestock grazing) and guarantees local support. There may be need to undertake additional local consultations as part of the final selection process.

There is potential that restoration measures will provide new temporary employment opportunities for the local residents and this may generate interest and support for the planting. Two of the proposed compensation planting species (Chestnut and Bladder nut) can generate future income and are traditionally used by communities in the area. This can potentially increase local support.

Proposed tree species follow the natural species composition. They were removed in approximately the same area. This increases the chances of long-term sustainability of the proposed plantations since they are well adapted to the local environment. They will also exhibit better resilience to major changes such as in climate change.

The preferred approach to compensations is allocation of land that have been somewhat degraded due to natural causes or illegal logging and remediating/restoring those. Those locations were identified around the cutting sites at Tunnel N1, also on other locations affected by the construction along the entire perimeter or the road. Proposed planting locations are provided in Section 8 (Cartographic Data).

Some planting locations are covered with forest fragments and trees. Caressingly, only the so-called windows (openings) will be used for planting. Some locations are currently used for construction activities and are fully free of vegetation. They will be used for planting following the reinstatement. Area available for planting is taken at 60/40 for each plot (considering that some areas are fully free of vegetation) and relevant calculations are also based on this approach.

2.4 Natural Conditions of the Planting Locations

2.4.1 Climate

Climate in Western Georgia is tropical, which is influenced by dry air coming from the Eastern Caspian and Central Asia and humid air coming from the Black Sea. Location of Caucasus Mountains in the North-East protects territory from cold air coming from the North. High mountains result in condensation and consequently, humidity is high. Area is characterized by high precipitation.

Territory is located in humid sub-tropical section and is characterized by zonal distribution of climate. More specifically, in the valleys of the rivers Dzirula and Chkherimela up till 600 m above sea level humidity is high, winters are moderately cold and summers are relatively hot. Average annual temperature is 10°C – 13°C. Absolute minimum can drop down to - 22°C – 24°C and absolute maximum can reach 38°C – 40°C. Annual precipitation is 1,200- 1,400 mm.

2.4.2 Soils

Imereti region is characterized with wide variety of soils. In the elevated areas forest ash-grey soil is common. Road itself is located on the Imereti lowland, which is characterized by podzol and alluvial soils. Their occurrence is dependent on the age of the landscape. Podzol soil are present on the older landscapes and on younger (upper quaternary) river terraces weakly developed alluvial soil are common. On most parts of the higher terraces along the road, podzol soils are present.

Maximum temperature of soils occurs in July-August and equals to 26-25 °C. Soil temperature is several degrees higher compared to the average air temperature. In winter, soil and air temperatures are the same, which is most probably caused by the Black Sea. Soil freezing depth is 0 cm. Topsoil depth along the road varies between 0.2-0.7 m.

3. Compensation Planting Approach

3.1 Basic Principles

As already noted above, the objective of the proposed compensation planting approach is adequate mitigation of GRL woody plant loss due to construction for F4 section of E 60 Highway as described in subsequent sections. The planting fits into the over aim of the project, which is to achieve no net biodiversity loss by ensuring that the biodiversity is protected and enhanced where possible.

Due to the permanent loss of natural forest habitats, offsetting through the creation of similar habitats is required to reduce the long-term impacts. Although there will be a delay before the new habitats become of equal conservation value, the habitat creation is an important component in offsetting the overall impacts of the Project on biodiversity.

3.2 Replacement Species

Various options have been analyzed when selecting the replacement species. Major emphasis was placed on substituting what was removed. Additionally, habitat suitability and values of replacement species to the local biodiversity was also factored in during decision making. Comment/recommendation on the first revision of the plan received from the National Environmental Agency regarding positive experience of planting Chestnut (*Castanea sativa*) and Walnut (*Juglans regia*) along the highways in Georgia was also taken into consideration.

The decision was made to plan all three affected species (Zelkova, Chestnut and Walnut) in equal numbers. This area is natural habitat for these species, which will be additional positive factor for their adaptation to the environment.

As detailed in Table 3 above, number of GRL species inventoried for removal is 309. This includes both <8cm and >8cm. Due to importance of all three species to local ecosystem and considering recommendation of the National Environmental Agency, the decision was made to plant all three species in equal numbers. This is further supported by the fact that Chestnut plantations in Georgia were adversely affected by the disease. There is also positive experience of planting Walnut along the highways in the country. Rare, endemic species replanting ratio is generally 1:5 meaning that 1,545 saplings have to be planted. As noted, these quantities were equally distributed between all three species. Further details are provided in **Table 3**.

Table 4: Number of Trees to be Planted

Inventoried Species	Status	Planting Ratio	Proposed Number of Saplings
Zelkova (<i>Zelkova carpinifolia</i>)	Red List	1:5	515
Chestnut (<i>Castanea sativa</i>)	Red List	1:5	515
Walnut (<i>Juglans regia</i>)	Red List	1:5	515

It is planned to purchase saplings of all trees from local nurseries. As an alternative for Zelkova (*Zelkova carpinifolia*) propagation from seeds is considered. Seeds have to be collected sometime end of October and planted into the soil. These saplings will then be transplanted into the planting areas similar to saplings acquired from nurseries. For details refer to section 4. Noting again that this option is only an alternative in case enough sapling cannot be obtained from the local nurseries.

Planting and maintenance/aftercare provide further information regarding the post planting activities.

3.2.1 Zelkova

Zelkova grows on the terraces and slopes of medium inclination, mostly on the southern parts. It is a tertiary relict has a very limited distribution area.

In general, there are 5-6 varieties of the species, mostly in eastern Asia. Only this particular variety (*Zelkova carpinifolia*) is found in Georgia. It has to be noted that the scientific name of the species "Zelkova" is derived from the Georgian word "Dzelkva".

Zelkova is a deciduous plant. Its height is 15-30 m, the diameter of the main trunk is 2 m. Trunk is greyish-green. Leaves are prolonged egg shaped or elliptical, with pointed ends, stemless or with very small stem, with unequal sides and jagged. Flowers are brown, thin, with 4-5 parts. Some flowers are hermaphrodite, some male. Fruit is greenish, angled-wrinkled with bent "beak" on the back.

Plant blossoms in March, fruit ripen in August-September. Branches with fruits fall in Autumn and Winter.

As noted, Zelkova is a very rare species. Apart from Georgia it is only found in North-Eastern Turkey, Lankaran, Azerbaijan and Hirkan, Northern Iran, along the Caspian shore. In Georgia it is found in Samegrelo, Imereti, Guria and Kakheti, in lowland and lower parts of mountains (in some places reaching up to 1600-1700 m above sea level); It forms small plantations in deciduous forests.

Zelkova has heavy, elastic, very durable trunk.

This species is included in Georgian Red Book (1982) and Red List (2006).

Relatively larger populations can be found in Ajameti and Babaneuri Natural Reserves.

3.2.2 Chestnut

There are over 10 varieties of chestnut on the Atlantic Coast of the North America, Eastern Asia, Caucasus and Mediterranean. Only this particular variety can be found in Georgia (*Castanea sativa*).

Chestnut is a deciduous tree. Its height reaches 30 m, with the diameter of the main trunk reaching 2 m. Branches are reddish-brown with warts. Leaves are lancet shaped or egg shaped, narrowing towards the end, pointy towards the front and dentate-leaved. Dentate is pointy and bent. Leaves are 1-25 cm long. Flowers are male or female. They are greenish or yellowish. Fruit is a nut, rarely with more than 2-3 seeds. It is brown, covered with shiny layer, located in the nest covered with thorny layer from the outside.

It blooms in June, fruit ripens in September and falls in September-October.

It is spread in Western and Southern Georgia, in Borjomi and Liakhvi valleys, on the Kakheti section of Caucasus on lower and medium mountains from 500 m above sea level to 1200-1400 m, sometimes reaching 1600m. It creates chestnut plantations or is in mixed forests with other species. In the past chestnut was found on Kolkheti lowland also. This is confirmed by solitary individuals found there up till today.

Chestnut is a very useful plant. Both its fruit and trunk are very valuable. It also supports honey making.

This species is included in Georgian Red Book (1982) and Red List (2006).

3.2.3 Walnut

Up to 20 (or up to 40 according to other sources) varieties of walnut can be found in temperate, subtropical and partially in tropical regions, mostly in southern Europe, Eastern Asia and Northern and Southern America. Only this particular variety can be found in Georgia (*Juglans regia*).

Walnut is a deciduous tree, reaching height of 35 meters. It has round crown. Main trunk and branches are covered with grey, cracked peelings. Leave system is comprised of 3-5 leaves of 20-40 cm long. They are oval/egg (reverse egg) shaped, end is with small point or blunt. Flower is male or female. Male flowers create long, green raceme located on the year-old branches. Female flowers are relatively hard to see. Fruit is with stone, covered first with green and then brown outer layers and then solid inner layer. There is one seed with two parts, wrinkled, covered with white yellowish layer.

Walnut blooms in April, before tree grows leaves. Fruit ripens in August-September. It can be found in almost all parts of Georgia, on lower and medium mountains 1500-1700 m above sea level. It grows on river banks, deciduous forests, sometimes creating small plantations.

Walnut is a useful plant. Fruit contains 60-70% edible oil. Trunk is grey, solid, elastic with good texture. Leaves, stem and bark contain substances that can be used for making paints.

This species is included in Georgian Red Book (1982) and Red List (2006).

4. Scope of Activities and Works

4.1 Saplings

Priority option of obtaining the saplings is from the existing nurseries. Due to their relatively widespread nature, obtaining walnut and chestnut is unlikely to be an issue.

If enough Zelkova saplings cannot be found in nurseries. Seeds will be collection and propagated as described in Section 4.2 below.

4.2 Zelkova Propagation from Seeds (Alternative Option)

This will only be implemented if enough saplings cannot be obtained from nurseries.

The source populations for collection of seeds of Zelkova will be selected in Imereti region, preferably adjacent to the territories where trees were removed subject to seed availability. Collection will be done end of October.

Selection criteria were as follows:

1. The population is wild, self-sown and not planted or cultivated
2. The population is likely to be genetically similar (defined, for example, by soil, climate, altitude, close proximity to the affected populations, etc.)
3. Healthy populations with no signs of damage and / or diseases
4. Availability of high number of mature specimens producing large seed-sets (at least 50 individuals can be sampled randomly and evenly)
5. Stands growing in the road sides and other man-made habitats were avoided.

Seed collection will be carried out in compliance with the following:

1. Small, representative sample of seeds will be carefully examined using the cut test and a hand lens. This allows estimation of the frequency of empty or damaged seeds, and confirmation of seed maturity
2. Mature, dry seeds to be collected into bags well secured with tape
3. No more than 20% of the available seeds were collected from the selected source specimens. This ensured that the sampled population is not endangered by the seed collecting.

All seeds will be collected manually from mature trees which produce abundant fruits in the vicinity.

Collected seeds will be dried 2-3 days in a dry well-ventilated room. Seeds to be turned 2-3 times a day to prevent overheating and die-back. The seeds were tested manually to confirm dry condition. Then they were sown at seed-beds prepared in advance.

Planting sites will be prepared in advance by making 1-1.5 cm and 6-8 cm deep trenches covered with topsoil and graded on elevated planting beds seeds.

Maintenance activities to be implemented as follows:

- Manual tillage and soil loosening
- Manual weeding
- Manual watering.

Manual soil tillage and weeding will be required approximately twice a month in June, July and August while watering was carried out twice per month in July and August.

Seedlings to be inspected regularly during active vegetative period from early May to late September.

Depending on growth rate after 2-3 years seedling will be ready for planting in the natural environment.

4.3 Planting Specifications

Preferred time for planting in the target area is autumn when night temperatures are above zero. Planting can be implemented in spring as well, but it is essential to ensure temperatures are above zero at all times. Allowance should be made for mortality rate in the first and second years after the planting, in particular: approximately 25-30% mortality in the first year and 10-15% - in the second year via provision of adequate replacement planting.

All plant material shall be materially undamaged, sturdy, healthy, vigorous, of good shape and without elongated shoots, grown in a suitable environment and hardened off, free from pests, diseases, discoloration, weeds and physiological disorders, with balanced root and branch systems.

The following specifications should apply to bare-root saplings:

- Height: range 20-60 cm
- Basal caliper (measured 25 mm above the root collar): 5 mm minimum caliper with approximately 70% of the saplings between 6 and 9 mm
- Root systems characterized by an abundance of fibrous, flexible, heavily branched roots, and an absence of heavy, stringy, unbranched roots, root mass dense enough to indicate a good balance with the shoot
- Healthy branches or buds along the full-length of the stem
- Free from disease and top-damage.

For the purpose of transplanting the saplings from nursery to the planting site, saplings should be carefully uprooted first. This procedure should start by tying the branches together loosely. Approximately 65 cm deep trench should be dug around the tree at least 30 cm larger than the size of the root ball (or as much intact viable root material as practical). Roots extending from the ball should be carefully pruned. When the ball is partially exposed, it should be wrapped in jute starting from the base of the tree down using twine to secure the wrapping. Digging should be kept until the ball is undercut and sitting on a soil pedestal. After the above procedures, the tree should be tilted and wrapping finished securing the jute underneath.

For the safe transportation of saplings to the planting site, trees should be securely tied to the truck so they do not roll around during transportation. Rolling or other movement during shipping can crack the root ball and break roots. Trees transported on open trucks lose more water than those shipped in a closed truck and can come to the planting site in poor condition unless appropriately covered during transportation. The cover should be tightly secured so air moves over the cover and does not penetrate under it. Never transport trees uncovered; this can reduce its ability to survive planting. Trees should be irrigated just prior to shipping to help minimize desiccation.

Closed trucks should not be allowed to remain standing in the sun unless they are air conditioned. Trees could be injured if the temperature inside the truck is maintained at more than about 35°C.

Site preparation for planting should include mechanical leveling, removal of stones and waste and shrub residues.

Dimensions of pits for planting should be at least twice the diameter of the root spread, and 1.5 times the depth of the roots to be planted. The bottom and sides of the hole should be forked to break up the subsoil. The topsoil removed in the course of pit excavation should be placed into pits first (approximately 0.15 m thick for trees); the rest should be filled up with fertile soil, planting compost or other suitable growing media.

The wrapping around the rootballs should be removed directly before planting. The root system of saplings should be maintained in moist condition during delivery of the planting material to sites. Saplings should have smooth robust stem and undamaged root system. Rootballs of saplings should be enclosed within the soil. Adequate planting depth is a pre-requisite to fast growth; saplings should be planted so that the root collar is at a depth of 3-4cm from the ground surface and root system is located entirely in the fertile soil. In order to facilitate good adaptation and growth of the saplings, slow-release fertilizers should be incorporated into the backfill soil at a rate of 15-20g per sapling.

Lower branches up to a half of sapling height are cut off directly to the stem by pruning shears prior to planting deciduous saplings. At the top of the sapling, above the damaged free bud approximately 0.1m long ends are clipped so that the bud is located beneath the cutoff (partial clipping of branches reduces number of leaves, which slows down transpiration process as roots of newly planted saplings fail to function at full scale after planting). It is also necessary to shorten / prune damaged or long roots. If the roots were pruned, cutoffs must be renewed. Root bending should not be allowed during planting. Soil must be firmed / compacted thoroughly above the roots of the planted sapling.

Newly planted saplings should be held secure at the base until a new anchorage develops. A single stake and a tie should provide adequate support. Single stakes, which should generally be on the windward side of a tree, should be driven into the ground vertically. Vertical stakes should be driven before planting and should extend above the ground level to a maximum of one-half of the total sapling height. The stakes should be free from bark, snags, pests and diseases and should be of sufficient size to withstand the weight of sapling when exposed to the prevailing winds of the planting site. Tree sapling should be secured to the stake so as to prevent excessive movement. Abrasion should be avoided by using a buffer of rubber or plastics between the tree and the stake. The tree should be secured at the top of the stake; normally one tie should be used. Ties should be checked after strong winds and at least twice a year (as described in Maintenance/Aftercare Section 6), and should be adjusted or replaced to allow the growth. They should be

removed as soon as anchorage has been achieved.

A circular shallow trench is made around the planted sapling to maintain moisture; saplings are watered immediately after the planting (10 liters of water per sapling).

To conserve moisture and promote water and air penetration, the back filled soil surrounding newly-planted trees can be covered with mulch consisting of material such as bark, wood chips, sawdust, fallen leaves or straw. The recommended mulch depth is 8 to 10cm.

During the growing season newly planted trees should be watered to ensure that the soil is kept constantly moist, although this will vary with local climate fluctuations.

At completion of planting, all debris should be removed and the works left in a clean and tidy condition.

At the initial planting stage, it is required to protect plantations from grazing via installation of barbed wire fence along entire perimeter of the planted area. The fence should be a four-strand barbed wire with line post spaced at 3m intervals; the line post height should be in the order of 1.6m above the ground.

Warning signs are to be erected to make local residents aware of the presence of the barbed wire. As part of the aftercare program the fencing shall be re-enforced where damage has occurred.

5. Pest Control Measures

Harmful insects comprise a biological factor, which may have a substantial negative effect on tree plantations. Particularly dangerous are pests, which propagate in numerous numbers in certain years and inflict significant damage on plantations, especially – those of deciduous plants. It is recommended to make use of mechanical and chemical pest control measures. Chemicals have to be selected so that they are approved for use in the country by the National Food Agency of Georgia (Legal Entity of Public Law, MEPA).

Zelkova pests haven't been properly researched. Based on different observations, below listed pests can create problems for this species:

- *Operophtera brumata* L. - 1,5-2 cm long yellowish-greenish worm, with grey lines on the back. It feeds on soft parts of leaves and leaving veins behind.
- *Byrsocrypta* sp. - Form of pathogenesis, damages leaves. Tips of damaged leaves bend towards the bottom and bulge between the veins. These sections become yellow in the beginning and then change color to red.

- *Anisandrus dispar* Fabr. – In general Zelkova bark has very few pests, but this one has been observed on young as well as older individuals.
- *Sinoxylon perforans* Schr. – Is also a bark pest. It is a brownish beetle with black head, 5-7 mm long with several appendices in the back. It makes cylindrical or branched holes in the bark.

As noted above, fungal disease (so called chestnut cancer) of bark created serious problems for chestnut population in Georgia. Disease is caused by pathogenic fungus (*Cryphonectria parasitica*). Through the damage in bark, fungus gets into the tree and damages fibers of the bark that affects plants ability to intake nutrients and water from the soil. Due to this, the tree dies. Process starts from the top. This fungus is mostly countered by hypervirulent fungus derived in the labs. The following are also chestnut pests: *Cameraria ohridella*) and other fungi (*Phyllosticta castaneae* Ell. Et Ev.; *Cylindrosporium castanicola* (Desm) Bert etc.).

The following are chestnut pests:

- *Carpocapsa pomonella* Z. – The worm of the pest is approximately 18 mm. The butterfly is also the same size. Worm is covered with thin grey spots that have single hair. It is pink from the top and lighter from the bottom, chest is yellowish. Worms move on the surface of the fruit for some time, then drill through the skin and start eating the inside. Worms create holes and chambers inside the fruit.
- *Epidiaspis leperii* (betulae) Sign – Prior to start of feeding, body of the pest is pink, then it becomes red. It is roundish, flat and grey. During mass reproduction, pests create colonies on stems, branches and sprouts of the plant. Pests in the colony suck liquid from the plant, due to this certain growths are formed on the damaged sections, sprouts wither and if number of pests is very high, plant dies.
- *Palaeolecanium bituberculatum* Targ. – Female pest is light brown and has greyish or brownish spots and stripes, there are dents and some growth from the top. Pest is oval shaped. Its width is 4-6,5 mm, height is 2,5mm. Worms suck liquid from the leaves and leave excrement on the surface of the leaves. Leaves are covered with dark coating. Therefore, leaf functionality decreases and plant productivity is affected.
- *Xyleborus* (*Anisandrus*) *dispar* F. – Body of the female pest is brownish. Feet and mustache are yellow. Upper wings have lines of thick dots. Females have swelling on the back. Body of the males is covered with long fur and its back is almost flat and slightly roundish. Length of the female beetle is 3-3,5 mm. Length of the male beetle is 2 mm. Beetles eat bark of the trees, which is especially problematic for young trees.
- *Chromaphis juglandicola* Kalt. – Body and mustaches are light yellow. They have mustaches, red eyes and small tail. Pest feeds on leaf liquid. Damaged leaves become weaker and brownish damaged spots develop. These leaves are highly susceptible to sunlight.

All these pests are managed by removal of damaged parts (branches, leaves etc.) and their destruction and by use of relevant insecticides. If pests are detected, decision making measures to be implemented will be made following the consultations with the relevant specialists.

6. Aftercare

Maintenance is a key factor for establishment of plantations, which requires particular care during the first two-three years after the planting. Maintenance periods should be in line with the local environmental conditions. Particular care should be provided in the first year after planting when saplings are too weak and not established. At this time slight carelessness might result in sapling mortality. It is also necessary to implement a pest monitoring in the plantations, identify pest type in case of disease and plan appropriate elimination / control measures.

It is recommended to carry out maintenance works four times in the first year of planting. The recommended periods for tillage / loosening and watering are May, June, July and August (first weeks of the above months). Tillage and loosening of plantations should be conducted in a circular fashion (at a diameter of 0.8m) on an area of 0.5m².

The plantations should be watered immediately after planting and at least five – seven more times throughout the year (June, July and August). It is desirable to conduct watering in dry periods of these months. Watering rate is 20 l water for one tree.

Mowing should be conducted using special mowing appliances 3-4 times throughout the year (on as required basis) so that height of herbaceous cover does not exceed 10-15cm at any time.

In late fall it is necessary to assess plantation establishment / mortality rate, identify various damaging factors / causes, check firmness of plant supporting stakes so that all planted saplings are securely tied. All failed saplings should be replaced next spring via planting the same species and numbers of trees.

It is recommended to implement maintenance at least four times a year (second half of May and second half of June) and watering at least twice a year (June, July, August) in the second to fifth years. Mowing should be conducted as described above.

In the sixth-tenth years of the planting annual maintenance should be implemented twice (first half of June and August) while watering should be conducted only once (July). However, annual mowing should be conducted as described above.

If success rate of GRL tree survival planted for the purposes of habitat restoration is below 80%, Contractor will replace dead trees with the ratio of 1:1.

Typical aftercare activities are summarized in the table below.

Table 3: Overview of Main Maintenance/Aftercare Activities

#	Activity	Season
1.	Weeding (removal of unwanted plants)	Spring/Summer
2.	Tillage/loosening of soil	Spring/Autumn
3.	Grass cutting	Spring/Summer
4.	Application of fertilizers	Spring/Autumn
5.	Mulching	Autumn
6.	Watering	Spring/Summer
7.	Repair of tree stakes and ties	As required
8.	Repair of fencing	As required
9.	Pest control	As required
10.	Trimming (removal of overgrown lower branches)	As required
11.	Replacement of dead trees	Spring/Autumn
12.	Assessment by botanist	Spring/Autumn

7. Monitoring

Annual monitoring of the plantations will be carried out to evaluate survival rate and develop intervention measures if required. The monitoring will include the following:

- The number of planted trees (and hence percentage) of trees showing clear signs of healthy growth (e.g., buds, leaves, evidence of green vascular cambium)
- Likely reasons for plant die-back if any
- Recommendations for intervention / plant replacement.

Annual monitoring should be carried out on a quarterly basis in the first three years after planting; thereafter, monitoring will include two field visits in early and late vegetative seasons for 2-3 more years dependent on planting success.

Monitoring of floristic diversity in the newly developed forest plantations is recommended to confirm transformation of the plantations to natural habitats.

8. Cartographic Material

Below cartographic material for 15 land plots proposed for compensation planting are provided including GPS coordinates and other technical information (area, perimeter etc.). As noted, in the areas that are covered with forests planting will be carried out in windows (openings).

15 potential locations were selected for compensation planting. Potentially, all 15 areas are suitable for planting. Some locations are directly adjacent to the highway, in some cases it is within the buffer zone. Following the start of the operation of the highway, existing conditions may change, therefore after the

completion of the construction and start of the highway operation, selected areas should be reinspected and their suitability for planting confirmed.

All 15 locations are currently considered for planting. However, they are potential locations and not all of them will be used for planting. As noted above, locations will be finally confirmed after the completion of the construction and highway operation. Based on the number of trees to be planted and the area requirement per plant, it is planned to use maximum 5 locations out of 15. Cost estimate is based on the first 5 proposed plots. Company is also willing to consider any alternative suggestions that Ministry might have with this regard.

Areas have been selected so that habitats of proposed species are maintained and areas are easily accessible for maintenance/aftercare.

Figure 4: Proposed Planting Plot N1 near Tunnel N1, Zestafoni Forestry District, Pesticide Forestry, Former Ilemi Farming Forestry (Left Bank for the River Dzirula)



N	Coordinates	
	X	Y
1	345086.8348	4661923.407
2	345147.9645	4661927.882
3	345183.8828	4661913.879
4	345197.206	4661892.969
5	345192.7841	4661870.861
6	345074.5066	4661899.887

Perimeter: 296 m

Area: 4,317 m²

Figure 5: Proposed Planting Plot N2 near Interchange N1 (Left Bank of the River Dzirula)



N	Coordinates	
	X	Y
1	838863.242	4668144.35
2	838827.566	4668115.054
3	838825.9515	4668112.808
4	838809.8123	4668090.363
5	838803.6014	4668063.578
6	838800.5398	4668036.943
7	838799.1159	4667986.227
8	838792.3241	4667982.749
7	838779.9214	4667987.877
8	838774.5999	4668006.572
9	838775.7442	4668018.687
10	838783.3963	4668032.412
11	838783.4094	4668040.359
12	838781.4406	4668050.028
13	838780.3116	4668055.573
14	838776.8946	4668061.97
15	838757.7689	4668074.637
16	838744.5012	4668091.744

N	Coordinates	
	X	Y
17	838749.9041	4668114.207
18	838764.9694	4668128.411
19	838784.5414	4668135.736
20	838863.242	4668144.35
21	838827.566	4668115.054

Perimeter: 469 m

Area: 6,631 m²

Figure 6: Proposed Planting Plot N3 near Interchange N2 (Left Bank of the River Kvirila)



N	Coordinates	
	X	Y
1	340456.6361	4662939.1
2	340432.1747	4662901.984
3	340301.1254	4662982.927
4	340330.8486	4663013.315

Perimeter: 387 m

Area: 6,437 m²

Figure 7: Proposed Planting Plot N4 near Bridge N5 (32.03.44.018)



N	Coordinates	
	X	Y
1	337670.9252	4664532.9671
2	337776.7762	4664603.4325
3	337796.8502	4664577.9991
4	337688.0305	4664509.1151

Perimeter: 318 m

Area: 3,941 m²

Figure 8: Proposed Planting Plot N5 near Disposal at KP9.7



N	Coordinates	
	X	Y
1	337329.82	4664844.846
2	337329.2479	4664874.213
3	337419.2975	4664880.106
4	337421.4784	4664852.798

Perimeter: 239 m

Area: 2,584 m²

Figure 9: Proposed Planting Plot N6 near KP11.3



N	Coordinates	
	X	Y
1	336174.0516	4665907.957
2	336188.8343	4665929.263
3	336204.0061	4665957.659
4	336215.8459	4665952.117
5	336184.9263	4665900.104
6	336143.175	4665865.02
7	336135.2375	4665873.275
8	336153.419	4665887.128

Perimeter: 250 m

Area: 1,339 m²

Figure 10: Proposed Planting Plot N7 near KP10.9



N	Coordinates	
	X	Y
1	336539.0342	4665634.891
2	336529.0173	4665618.733
3	336463.4132	4665658.055
4	336476.9032	4665671.225

Perimeter: 186 m

Area: 1,381 m²

Figure 11: Proposed Planting Plot N8 near Interchange N4



N	Coordinates	
	X	Y
1	332885.9861	4667118.266
2	332958.832	4667081.264
3	332952.0389	4667050.98
4	332873.5045	4667085.328

Perimeter: 234 m

Area: 2,737 m²

Figure 12: Proposed Planting Plot N9 near Interchange N1 (Second Option)



N	Coordinates	
	X	Y
1	342556.1472	4661842.254
2	342555.309	4661820.544
3	342437.9813	4661843.256
4	342443.0119	4661866.146

Perimeter: 280 m

Area: 2,639 m²

Figure 13: Proposed Planting Plot N10 near Interchange N3



N	Coordinates	
	X	Y
1	335582.094	4666035.055
2	335633.6742	4666010.722
3	335567.7111	4666008.954
4	335500.4731	4666015.808
5	335437.6449	4666029.614
6	335457.7733	4666037.883
7	335478.0803	4666048.667
8	335485.173	4666053.118
9	335504.3333	4666072.597

Perimeter: 422 m

Area: 5,582 m²

Figure 14: Proposed Planting Plot N11 near Interchange N4 (Second Option (32.03.49.358))



N	Coordinates	
	X	Y
1	332863.9484	4667137.571
2	332850.9459	4667107.808
3	332777.8799	4667179.596
4	332784.0455	4667190.685

Perimeter: 244 m

Area: 2,161 m²

Figure 15: Proposed Planting Plot N12 near Exit of Tunnel N5

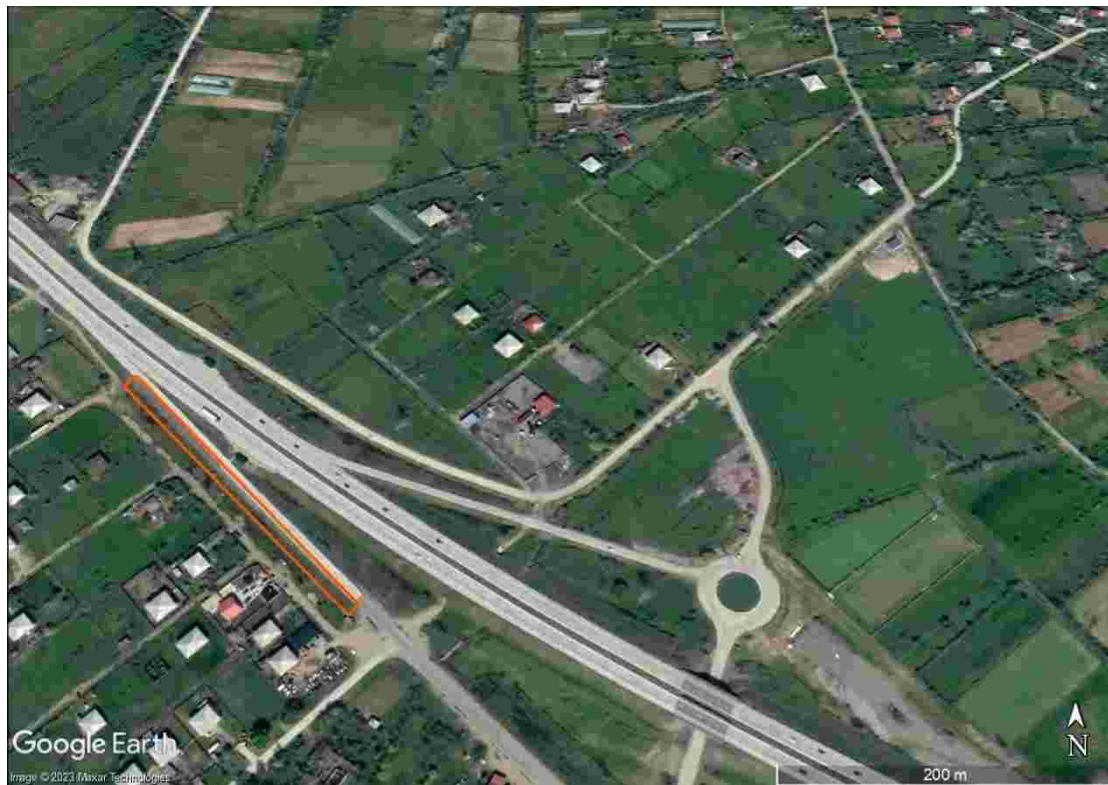


N	Coordinates	
	X	Y
1	338515.5654	4664457.411
2	338623.8204	4664440.397
3	338624.1232	4664433.135
4	338515.1747	4664447.481

Perimeter: 237 m

Area: 934 m²

Figure 16: Proposed Planting Plot N13 near Interchange N4 (Third Option)



N	Coordinates	
	X	Y
1	332483.5227	4667421.242
2	332664.9458	4667231.355
3	332659.4484	4667223.554
4	332475.6402	4667411.851

Perimeter: 548 m

Area: 2,835 m²

Figure 17: Proposed Planting Plot N14 Near Bridge N5 (Second Option)



N	Coordinates	
	X	Y
1	337722.1067	4664712.175
2	337722.5468	4664714.466
3	337735.77	4664720.125
4	337736.9964	4664718.086
5	337737.78	4664718.74
6	337754.26	4664696.41
7	337762.29	4664692.775
8	337781.5025	4664693.576
9	337781.7961	4664692.592
10	337792.7552	4664687.427
11	337793.7796	4664688.192
12	337807.1697	4664679.665
13	337796.1691	4664670.076
14	337739.0058	4664691.025
15	337724.8544	4664693.97

Perimeter: 215 m

Area: 1,370 m²

Figure 18: Proposed Plot N15 Adjacent to Bridge N5 (Third Option)



N	Coordinates	
	X	Y
1	337703.4568	4664622.192
2	337720.1741	4664599.522
3	337699.8467	4664582.121
4	337689.3764	4664595.128
5	337681.0658	4664610.789

Perimeter: 114 m

Area: 832 m²

9. Cost Estimate

Table below presents approximate cost estimate for proposed compensation planting. As noted above, on the areas covered with forest planting is planned on existing windows (openings) that are unequally spread and saplings will be distributed as per size of openings. Saplings are assigned as per total available area 1,43 ha with 1,080 plant per 1 ha. This number (1,545 on 1,43 ha) in combination with existing vegetation on the land plots will ensure proper reinstatement of the areas. Saplings will be distributed in windows and open areas (in certain areas symmetrically and in some areas sporadically, that will create settings characteristic to natural forests).

#	Activity	Unit	Quantity
1	Total compensation planting area:	m²	23,911
1.1	Including actual compensation planting area (60% of total area)	m ²	14,346
1.1.1	Including Plot N1	m ²	2,590
1.1.2	Including Plot N2	m ²	3,979
1.1.3	Including Plot N3	m ²	3,862
1.1.4	Including Plot N4	m ²	2,365
1.1.4	Including Plot N5	m ²	1,550
2	Cleaning of the Area from Sub-forest (blackberry, rhododendron) and weed (fern, hogweed etc.), cutting and removal	m²	14,346
3	Fencing:		
3.1	Perimeter	m	1,709
3.2	Wooden Poles (D=10-12 cm; H=1.6 m)	pcs	855
3.3	Barbed Wire (5-lanes)	m	8,545
3.4	Nails (7 mm) for Fixing Wires to the Poles	pcs	4,273
3.5	Gate	pcs	5
4	Marking/Preparation of pits for planting with Sizes: 0.3 m X 0.4 m	pcs	1,545
5	Preparation of Saplings in the Nurseries: Removal, Sorting, Delivery (Zelkova, Walnut, Chesnut)	pcs	1,545
6	Planting in the Prepared Locations	pcs	1,545
7	Driving Stakes into the Soil	pcs	1,545
8	Tying of Sapling to the Stakes (rope)	pcs	1,545
9	Post Planting Watering	liter	15,450
10	Fertilizer (slow soluble)	gram	30,900
11	Mulching (10 cm thick)	m²	185
12	Phytosanitary	kg	as required
13	Preparation and Installation of Banners Indicating Compensation Planting Activity and Planting Date	pcs	5

Annex 1: Decrees of the Government of Georgia On Removal of Red List Species from Natural Environment

Decree N1328



საქართველოს მთავრობის გ ა ნ კ ა რ ბ უ ლ ე ბ ა

N1328 2022 წლის 25 ივლისი ქ. თბილისი

საქართველოს რეგიონული განვითარებისა და ინფრასტრუქტურის
სამინისტროს გამგებლობაში არსებული სახელმწიფო საქვეუწყებო
დაწესებულებისთვის – საქართველოს საავტომობილო გზების
დეპარტამენტისთვის საქართველოს „წითელი წუსხით“ დაცული მცენარეთა
სახეობების ბუნებრივი გარემოდან ამოღებაზე თანხმობის მიცემის შესახებ.

1. საქართველოს „წითელი წუსხისა“ და „წითელი წიგნის“ შესახებ“
საქართველოს კანონის 24-ე მუხლის პირველი პუნქტის „ვ“ ქვეპუნქტისა და
ამავე მუხლის 2^o პუნქტის შესაბამისად, E-60 აღმოსავლეთ-დასავლეთ
მაგისტრალის შორაპანი-არგვეთის (F4) მონაკვეთის მშენებლობის მიზნით,
საქართველოს რეგიონული განვითარებისა და ინფრასტრუქტურის
სამინისტროს გამგებლობაში არსებულ სახელმწიფო საქვეუწყებო
დაწესებულებას – საქართველოს საავტომობილო გზების დეპარტამენტს
მიეცეს უფლება, ბუნებრივი გარემოდან ამოიღოს ზესტაფონის
მუსიციპალიტეტში, პროექტის განთავსების ზოლში მდებარე (მიწის (უძრავი
ქონების) საკადასტრო კოდები: №32.16.38.363, №32.17.32.390 და №32.15.42.347),
საქართველოს „წითელ წუსხაში“ შეტანილი მცენარეების შემდეგი სახეობები:

ა) „ჩვეულებრივი წაბლი“ (*Castanea sativa* Mill.) – 1 (ერთი) ინდივიდი;

ბ) „ძელქვა“ (*Zelkova carpinifolia* Pall.) – 236 (ორას ოცდათექვსმეტი) ინდივიდი.

2. საქართველოს რეგიონული განვითარებისა და ინფრასტრუქტურის სამინისტროს გამგებლობაში არსებული სახელმწიფო საქვეუწყებო დაწესებულება – საქართველოს სავტომობილო გზების დეპარტამენტი ვალდებულია:

ა) საქართველოს გარემოს დაცვისა და სოფლის მეურნეობის სამინისტროს სახელმწიფო საქვეუწყებო დაწესებულებას – გარემოსდაცვითი ზედამხედველობის დეპარტამენტს (შემდგომში – გარემოსდაცვითი ზედამხედველობის დეპარტამენტი) წინასწარ აცნობოს საქართველოს „წითელ ნუსხაში“ შეტანილი მცენარეთა სახეობების ბუნებრივი გარემოდან ამოღების დაგეგმილი ვადების შესახებ;

ბ) ამ განკარგულების პირველი პუნქტით განსაზღვრულ ტერიტორიაზე არსებულ მიწის ნაკვეთებზე მოჭრილი მერქნული რესურსი, კანონმდებლობით დადგენილი წესით, გადასცეს სსიპ – ეროვნულ სატყეო სააგენტოს.

3. ამ განკარგულების პირველი პუნქტით გათვალისწინებული, საქართველოს „წითელ ნუსხაში“ შეტანილი მცენარეების ბუნებრივი გარემოდან ამოღებაზე კონტროლი განახორციელოს გარემოსდაცვითი ზედამხედველობის დეპარტამენტმა.

პრემიერ-მინისტრი



ირაკლი ღარიბაშვილი

Decree of Government of Georgia

N 1328 25 July, 2022, Tbilisi

[TRANSLATION]

on provision of permission to Roads Department of Georgia subordinate entity to Ministry of Regional Development and Infostructure of Georgia on removal of species protected under Georgian Red List from natural environment

1. In accordance with Georgian Law on Red List and Red Book, article 24 clause 1 sub-clause v and clause 2³ of the same article, for the construction of Shorapani-Argveta section of the E60 highway permission shall be granted to Roads Department of Georgia subordinate entity to Ministry of Regional Development and Infostructure of Georgia, to remove from natural environment the following red list species located in Zestafoni Municipality within the project corridor (cadastral codes of the land (immovable property): N32.16.38.363; N3217.32.390 and N32.15.42.347):
 - a) Chestnut (*Castanea sativa* Mill) – 1 individual
 - b) Zelkova (*Zelkova carpinifolia*) – 236 individuals
2. Roads Department of Georgia subordinate entity to Ministry of Regional Development and Infostructure of Georgia is obliged to:
 - a) Notify in advance regarding the planned timeframe of removal of red list species from the natural environment to the Environmental Supervision Department subordinate entity to Ministry of Environment Protection and Agriculture of Georgia (hereafter referred to as Environmental Supervision Department)
 - b) Timber removed from the land indicated in the article 1 of this decree shall be handed over to LEPL National Forestry Agency as per legal requirements
3. Control over removal from natural environment of the species indicated in article 1 of this decree shall be exercised by the Environmental Supervision Department.

Prime Minister

[Stamped]

Irakli Garibashvili



საქართველოს მთავრობის გ ა ნ კ ა რ ბ უ ლ ე ბ ა

N2095 2019 წლის 3 ოქტომბერი ქ.თბილისი

საქართველოს რეგიონული განვითარებისა და ინფრასტრუქტურის
სამინისტროს გამგებლობაში არსებული სახელმწიფო საქვეუწყებო
დაწესებულებებისთვის – საქართველოს საავტომობილო გზების
დეპარტამენტისთვის საქართველოს „წითელი ნუსხით“ დაცული მცენარეთა
სახეობების ბუნებრივი გარემოდან ამოღებაზე თანხმობის მიცემის შესახებ

I. „საქართველოს „წითელი ნუსხისა“ და „წითელი წიგნის“ შესახებ“
საქართველოს კანონის 24-ე მუხლის პირველი პუნქტის „ვ“ ქვეპუნქტისა და
ამავე მუხლის 2³ პუნქტის შესაბამისად, E-60 აღმოსავლეთ-დასავლეთ
მაგისტრალის შორაპანი-არგვეთის (F4) მონაკვეთის მშენებლობის მიზნით,
საქართველოს რეგიონული განვითარებისა და ინფრასტრუქტურის
სამინისტროს გამგებლობაში არსებულ სახელმწიფო საქვეუწყებო
დაწესებულებას – საქართველოს საავტომობილო გზების დეპარტამენტს
(შემდგომში – საქართველოს საავტომობილო გზების დეპარტამენტი) მიეცეს
უფლება, ბუნებრივი გარემოდან ამოიღოს ზესტაფონის მუნიციპალიტეტის
ტერიტორიაზე, პროექტის განთვსების ზოლში მდებარე, საქართველოს
„წითელ ნუსხაში“ შეტანილი მცენარეების შემდეგი სახეობები:

2

ა) 8 სანტიმეტრიზე მეტი დიამეტრის:

ა.ა) „კაკლის ხე“ (*Juglans regia* L.) – 9 (ცხრა) ინდივიდი;

ა.ბ) „ძელქვა“ (*Zelkova carpinifolia* Pall.) – 1 (ერთი) ინდივიდი;

ბ) 8 სანტიმეტრიზე ნაკლები დიამეტრის „კაკლის ხე“ (*Juglans regia* L.) – 20 (ოცი) ინდივიდი.

2. საქართველოს საავტომობილო გზების დეპარტამენტი ვალდებულია:

ა) საქართველოს გარემოს დაცვისა და სოფლის მეურნეობის სამინისტროს სახელმწიფო საექსპერტო დაწესებულებას – გარემოსდაცვითი ზედამხედველობის დეპარტამენტს (შემდგომში – გარემოსდაცვითი ზედამხედველობის დეპარტამენტი) წინასწარ აცნობოს საქართველოს „წითელ ნუსხაში“ შეტანილი მცენარეთა სახეობების ბუნებრივი გარემოდან ამოღების დაგეგმილი ვადების შესახებ;

ბ) მოქრილი შერჩეული რესურსი, დაუკოტრავი სახით, სახეობების მიხედვით, დაასაწყობოს სსიპ – ეროვნული სატყეო სააგენტოს მიერ მითითებულ ტერიტორიაზე და გადასცეს მას მიღება-ჩაბარების აქტით.

3. ამ განკარგულების პირველი კუნტით გათვალისწინებული, საქართველოს „წითელ ნუსხაში“ შეტანილი მცენარეების ბუნებრივი გარემოდან ამოღებაზე კონტროლი განახორციელოს გარემოსდაცვითი ზედამხედველობის დეპარტამენტმა.

პრემიერ-მინისტრი

გიორგი გახარია

Decree of Government of Georgia

N 2095 3 October, 2019, Tbilisi

[TRANSLATION]

on provision of permission to Roads Department of Georgia subordinate entity to Ministry of Regional Development and Infostructure of Georgia on removal of species protected under Georgian Red List from natural environment

4. In accordance with Georgian Law on Red List and Red Book, article 24 clause 1 sub-clause v and clause 2³ of the same article, for the construction of Shorapani-Argveta section of the E60 highway permission shall be granted to Roads Department of Georgia subordinate entity to Ministry of Regional Development and Infostructure of Georgia, to remove from natural environment the following red list species located in Zestafoni Municipality within the project corridor:
 - c) With the diameter larger than 8 cm
 - a. Walnut (*Juglans regia* L.) – 9 (nine) individuals
 - b. Zelkova (*Zelkova carpinifolia*) – 1 (one) individual
 - d) With the diameter smaller than 8 cm a. Walnut (*Juglans regia* L.) - 20 (twenty) individuals
5. Roads Department of Georgia subordinate entity to Ministry of Regional Development and Infostructure of Georgia is obliged to:
 - c) Notify in advance regarding the planned timeframe of removal of red list species from the natural environment to the Environmental Supervision Department subordinate entity to Ministry of Environment Protection and Agriculture of Georgia (hereafter referred to as Environmental Supervision Department)
 - d) Timber removed from the land in uncut state, segregated per species to be delivered for storage to the location indicated by the LEPL National Forestry Agency and handed over to them with delivery-acceptance act.
6. Control over removal from natural environment of the species indicated in article 1 of this decree shall be exercised by the Environmental Supervision Department.

Prime Minister

[Stamped]

Giorgi Gakharia