

# BIANNUAL ENVIRONMENTAL MONITORING REPORT

Loan No. 02560 – GEO  
July – December 2015



REPUBLIC of GEORGIA: ROAD CORRIDOR INVESTMENT PROGRAM – PROJECT 1, CONSTRUCTION SUPERVISION OF KOBULETI BYPASS ROAD

FINANCED BY THE ASIAN DEVELOPMENT BANK



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**For:**

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**Endorsed by:**..... **Date:**.....

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## EXECUTIVE SUMMARY AND CONCLUSIONS

A segment of the East-West Highway between Azerbaijan and Georgia and part of the Poti – Batumi – Sarpi road along the western coast of the country known as **Adjara Bypass Project** is being constructed by the Government of Georgia under loan financing from the Asian Development Bank. The Project was determined to be a **Category A** environmental project for which an EIA was processed. The total road length is around 45 km, mostly 2-lane (except in the vicinity of the Makhinjauri tunnel where it is connecting to existing 4-lane) with a number of bridges, culverts, retaining walls, and tunnels. Currently, out of the 4 Contract packages, Contract 1 construction work is nearing completion, and Contract 2 is actively being constructed with Sinohydro Company (China) as the Contractor and supervised by Dohwa Engineering Co., Ltd. (South Korea) as the Engineer.

Within the framework of the project's environmental management, the supervision tasks consist of continuous monitoring by the CSC (the Engineer), environmental monitoring and management of project implementation and assistance in ensuring the implementation of environmental management practices at each stage of the construction. The environmental monitoring is to be carried out by an International Environmental Specialist with the support of domestic environmental specialists. The specialists will develop an environmental auditing protocol for the construction period, formulate a detailed environment monitoring and management plan (EMMP), regularly supervise the environmental monitoring, and submit periodic reports based on the monitoring data and laboratory analysis reports. The specialist will also develop a program for hands on training of contractor's staff in implementing the EMMP.

During this current monitoring period, a number of environmental and safety issues were observed by the monitoring team and brought to the attention of the Contractor for corrective measures. An inspection audit was carried out by the Engineer's International Environmental Specialist in mid April 2014 and early January 2015, which became the basis for the writing of the Biannual Environmental Monitoring Report for the Employer (RD-MORDI) and Financier (ADB). The environmental, health and safety (EHS) issues observed within the period are generally categorized into the following: (i) Main road and access roads; (ii) Camp sites (iii) quarry site, (iv) crushing plant, (v) Rivers crossing the main road (vi) general safety concerns, (vii) Documentation and record keeping requirements.

## PART I: INTRODUCTION

### 1. PRELIMINARY INFORMATION

#### 1.1. Project Background and Objective of the Environmental Monitoring Activity

The Republic of Georgia, with its 3.7 million people, is bounded on the north by Russia and the Caucasus mountain range, to the south by Armenia and Turkey, to the west by the Black Sea and the east by Azerbaijan. With reference to ADB's Project Data Sheet (PDS)<sup>1</sup>, the Government of Georgia is intending to develop the subregional multi-corridor to make the most of the country's locational advantage as a transit hub for the Caucasus and for Euro-Asia road transport, particularly by providing a more efficient route for Turkey and Armenia related traffic. This sub-regional multi-corridor will also ensure Government's new strategic vision of the transport network security. The PDS identifies important of development objectives for an efficiently functioning multi-corridors such as (i) reduction of the cost of subregional and international transport, benefiting both the local economy and the economy of the subregion, and thereby stimulating the development of Euro-Asia trade links; (ii) the subregional multi-corridors also serve as principal domestic corridors linking the major cities, ports and tourist centers; (ii) and their development will enhance economic growth through more efficient passenger and freight transport, while enhancing safety.

In the ADB's Report Recommendation to the President (RRP, September 2009)<sup>2</sup> the development potentials of the East-West Highway between Azerbaijan and Georgia have been highlighted, with the ports of Poti and Batumi as the exit points in the Black Sea. These ports also serve the same function to the Agrak-Kapan-Yerevan-Bavra road in Armenia with two southern sections in Georgia. A major segment of this trade and tourist route is the 81 km Poti – Batumi – Sarpi road along the western coast of the country. This road segment, mostly located in the Adjara Autonomous Republic, is a key highway for international transit route in Georgia and a major link to beach resorts in Batumi and Kobuleti. During the tourist season, this road experiences a high volume of traffic and significant increase of accidents.

Because of these aforementioned issues and features, the Government of Georgia has decided with ADB's assistance, to construct the so-called Adjara Bypass Project along the Black Sea in Adjara region. The Project was determined to be a **Category A** environmental project for which an EIA was processed. The Project will construct a 2-lane new road (45km), except along a 1-km stretch near Makhinjauri tunnel, where it will merge with the existing 4-lane road. In addition, the Project will have a number of new bridges, culverts, retaining walls, and tunnels. The entire project road is packaged into 4 contracts<sup>3</sup> for preparation of detailed designs and implementation as follows:

- Contract 1 + 0 – Km 0 to Km 12.4 bypassing Kobuleti Town – a new alignment; widening of existing road from Km 30 to Km 33 near Makhinjauri tunnel
- Contract 2 – Km 12.4 to Km 31.3 bypassing Kobuleti Town – a new alignment

For the implementation phase of the project, construction supervision scope has been tendered with the following objectives of ensuring that (i) high quality construction is achieved; (ii) designs are carried out to the appropriate engineering standards; (iii) all work associated with the project

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<sup>1</sup> ADB-PDS for 41122-023: Loan 2560-GEO: Road Corridor Investment Program - Project 1 (from <http://www.adb.org/projects/41122-023/main>)

<sup>2</sup> ADB. September 2009. RRP - Proposed Multitranchise Financing Facility Georgia: Road Corridor Investment Program

<sup>3</sup> Government of Georgia. MORDI-Department of Roads. February 2012. Environmental Impact Assessment

are carried out in full compliance with the designs and specifications; (iv) the EA's engineers and domestic consultants receive in-country and international training in selected areas of tunnel design and construction and pavement design; (v) resettlement, social, environmental, road safety, and monitoring are implemented in accordance with the recommendations of various studies, plans, analysis of the project.<sup>4</sup> Contracts 1, 2, and 3 are covered in Tranche 1 while Contract 4 will be covered in Tranche 2.

As mentioned in the Terms of Reference (ToR) of the Construction Supervision, the environmental aspects would entail environmental monitoring and management of project implementation and assistance in ensuring the implementation of environmental management practices at each stage of the construction. In addition, the environmental specialist will develop an environmental auditing protocol for the construction period, formulate a detailed environment monitoring and management plan (EMMP), regularly supervise the environmental monitoring, and submit periodic reports based on the monitoring data and laboratory analysis reports. The specialist will also develop a program for hands on training of Contractor's staff in implementing the EMMP<sup>5</sup>.

## 1.2. The Project Area

The Kobuleti Bypass section is part of the so-called Adjara Bypass Project along the Poti – Batumi – Sarpı road located the western Black Sea coast of Georgia. The project road also forms part of the main road corridor East-West Highway between Azerbaijan and Georgia. Its connection with the Black Sea ports of Batumi and Poti and the tourist beaches in Kobuleti makes this road an important trade and tourism road for Georgia. Information and data on the Project Road has been extensively elaborated in the EIA documents for the project.

Focusing on the entire 32 km project road, the first 16 km and the last 4 km of the project road alignment traverses flat terrains of coastal plain with elevations ranging from 0 to 30 m. The rest of the project road runs through a rolling and hilly terrain with elevations ranging from 20 to 192m. In terms of geology, the project area shows manifestation of several tectonical features such as synclines and anticlines, folds and faults. It is underlain by bedrocks which are volcanogenic sedimentary rocks represented mostly by basalts with tuffa, gravellites and marls. The rocks show signs of intense weathering and disintegration due to the wet subtropical climate. As a result the surface strata generally consist of thick deposits of delluvial (loams and clay) and laterites (loam).

In terms of climate, the project area falls within the classification of seaside humid subtropical climatic zone with an average rainfall of 2000mm to 2800mm evenly distributed throughout the year, peaking in September and dipping in May. The average monthly temperature ranges from 5°C in winter to 22.5°C in summer; and the average monthly humidity ranges from 73 to 84%, with dominant northeasterly wind direction. The Project road traverses over four (4) major rivers of length more than 15 km, namely Natanebi, Choloki, Kintrishi, and Chakvistiskali; five (5) smaller rivers of lengths between 10 and 15 km, viz. Ochkhamuri, Achkva, Kinkishi, Dehkva, and Korolistiskali; and 16 streams.

The recognized protected areas near the vicinity of the construction site is the Ispani mire, which is also a RAMSAR wetland site (number 894) located around 350 meters away from the Project road between Km 6 to 12 of Section 1. This wetland has an area of 770 ha and contains two parts – Kobuleti State Nature Reserve (Ispani II, the northern area – 331.25 ha) and

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<sup>4</sup> ADB. 12 March 2010. Outline Terms of Reference for Consultants for Construction Supervision of Tranche I and Tranche II

<sup>5</sup> Ibid

Kobuleti Managed Reserve (Ispani I, the south west area- 438.75 ha). The Contractor is aware of this site and special attention is paid to avoid any direct impacts to this protected area.

The project's ecosystem is generally characterized by pastureland with cornfields, rolling lands, and wetlands. There are 55 species of mammals in the area with the bats considered as the vulnerable terrestrial mammal. The area is considered also as one of the important sites for Western Palaearctic birds' migration, such as eagle, vulture, falcon, and owl; other fowl species found are duck, crane, grebe, pelican, etc. Out of the 54 species of reptiles recorded in Georgia, about 16 reptiles can be found along the Project alignment. Out of 12 species of amphibians that thrive in Georgia, 10 of them exist in the Project area. In terms of fisheries, there are 47 freshwater and anadromus fish species occur in rivers, and streams of Adjara. The Black Sea salmon (*Salmo labrax*) is an endemic and anadromus species that migrates up the rivers of Kintrishi, Chakvistskali, Charkha during the spawning season.

The baseline environmental information gathered during the drafting of the EIA for the project are as follows:

**Table 1: Baseline Information for the Project Road**

Environmental Aspect	Parameter	Value
Surface Water Quality	Total dissolved solids (TDS)	44 to 164
	Dissolved Oxygen (DO) concentration	7.6 to 10
	Nitrate content	0.18 to 2.16 mg/l
	Hydrocarbons content	less than 0.2 mg/l
Groundwater Quality	TDS	less than 300 mg/l.
	TDS of spring water near Makhinjauri tunnel	75 mg/l.
	Bicarbonate as the major anion	36 to 246 mg/l
	Calcium as the major cation	5 to 56 mg/l
	Total coliform content in the groundwater wells	1,000 to 2,000
	Total coliform in spring water	50,000
Noise Quality	Background noise levels	27-32dBA
	Noise levels at a distance of 25m from the centre of the existing Poti – Sarpi road	74dBA
Air Quality	Concentrations of dust (PM)	0.025 to 0.89 mg/m <sup>3</sup>
	CO	0.11 to 2.04 mg/m <sup>3</sup>
	No <sub>2</sub>	0.03 to 0.042 mg/m <sup>3</sup>
Soil Quality	Lead content	8 to 19 mg/kg,
	Zinc content	58 to 84 mg/kg
	Cobalt content	10 to 21 mg/kg
	Copper content	13 to 66 mg/kg
	Nickel content	17 to 59 mg/kg.

The estimated population in 2014 in Adjara Region is around 396,600, consisting of 51% living in urban areas and 49% in rural areas. The ethnic groups are Georgian (97%), Armenian (2%), Russian (0.25%), Greeks, Abkhaz, etc. The most populated city is Batumi, with a population of 161,200. The Gross Domestic Product (GDP) of Adjara was estimated to be GEL 1675 million, contributing to 7.4% of the GDP of Georgia. The main industries in Adjara are manufacturing, agriculture and tourism. There are around 41 archeological sites identified near the Project area. A number of cultural monuments were discovered during the archeological expeditions in the ravines of Rivers Choloki, Ochkhamuri, Achkva, Kintrishi, Kinkishi, Chakvistskhali,

Korolistskhali and Chorokhi. A map of the Project road with active construction is shown in Figure 1 below.

### **1.3 Preparation and submission of Final Environmental Compliance Audit Report.**

Group of Environmental Specialist considered under the Engineer's Contract are involved in preparation of Final Environmental Audit Report, Draft Final document for review will be submitted to ADB by the end of February 2016.



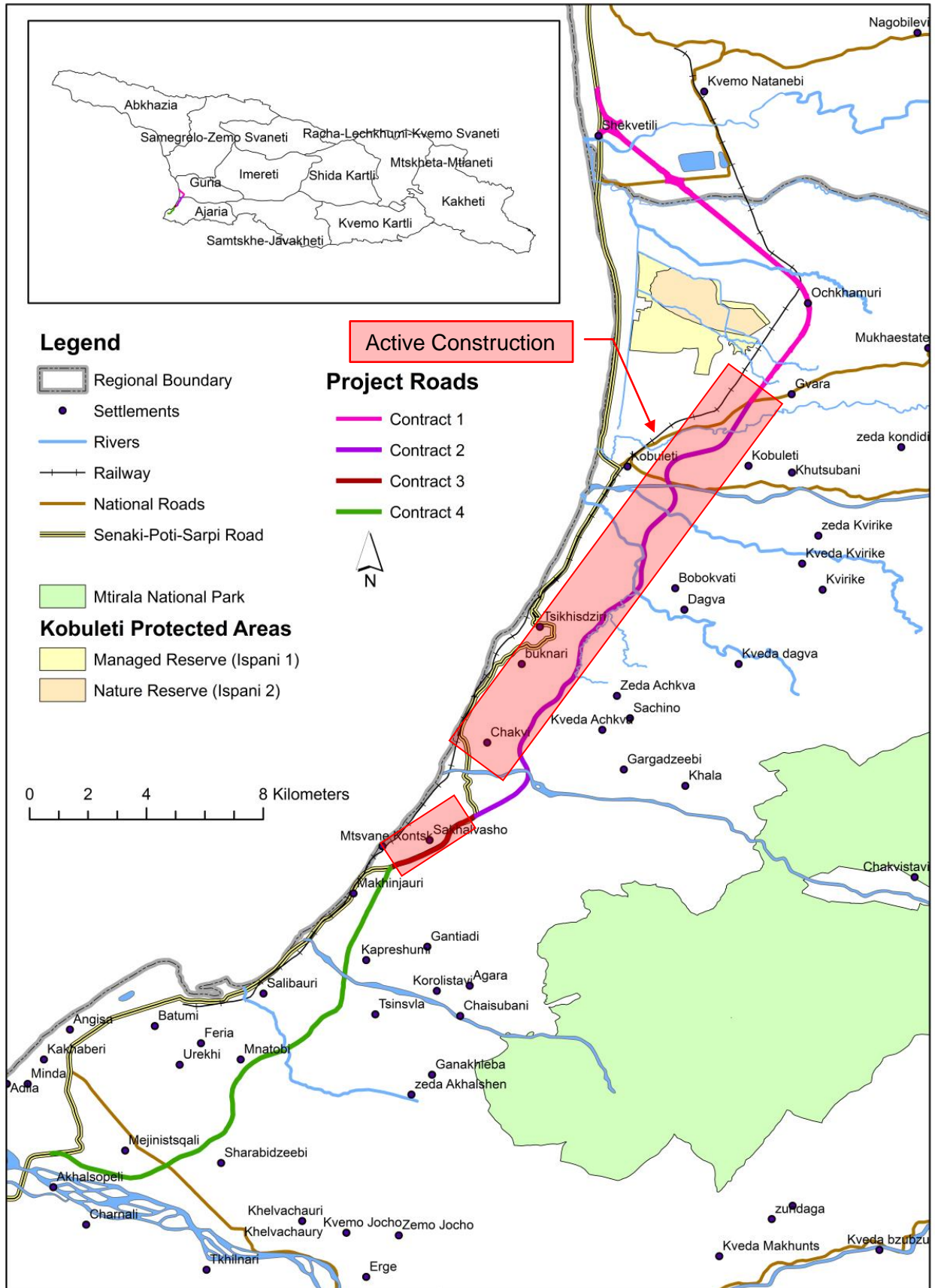


Figure 1: Location Map of the Project

#### 1.4 Project progress for the reporting period

As of the current date, the construction is primarily concentrated on the Contract 1 (Km 31 + 259), and Contract 2, Section 1 (Km 12.4 to Km 19) and Section 2 (Km 19 to Km 25), bypassing Kobuleti Town, a new alignment. The Contractor has extensively worked and seemed to have no issues with regards to physical progress. The progress of the construction activities in the previous six months are as follows (Table 1):

**Table 2: project progress during the previous 6 months**

No.	WORK DESCRIPTION	UNIT	DESIGN	ACTUAL	%	REMARKS
<b>Setting Out and Site Clearance</b>						
1	Basic survey and detailed setting out of road and right-of-way:					
	On main road	km	18.858	16.34	86.65	
	On interchanges, junctions and local roads	km	8.770	4.059	46.2	
	Removal and disposal of wire mesh fences	m	1,700	1,700	100	
	Cutting of trees (d >1 m), saw cut and disposal	unit	153	126	82.4	
	Cutting of shrubs, uprooting and transportation	ha	117	107.31	91.72	
	Demolition of Walls	m <sup>3</sup>	200	55.20	27.6	
	Tree felling & removal of Trees greater than 0.1m in grith	each	860	79	9.2	
	Demolition of Buildings	m <sup>3</sup>	7,650	421.06	5.50	
	Removal & Disposal of Concrete Fences	m	300	31.00	10.3	
<b>Earthwork</b>						
2	Removal of top soil, loading and transportation	m <sup>3</sup>	234,780	194,521.69	82.85	
	Excavation of soil and disposal (suitable for embankment filling and unsuitable)	m <sup>3</sup>	759,655	446,049.41	58.72	
	Shaping, leveling and compaction of roadbed surface	m <sup>3</sup>	278,156	194,172.74	69.81	
	Construction of embankment (from quarry to fill)	m <sup>3</sup>	2,389,048	2,381,159.66	99.67	
	Transport of Stockpiled topsoil and spread on embankment slopes	m <sup>3</sup>	134,879	112,965.98	83.75	
	Construction of vertical drainage in weak soils (PVD)	m	548,857	308,406	56.2	
	Sand blanket, 1500 mm thick	m <sup>2</sup>	55,553	54,419	98.0	
	Laying geotextile, 250 g/m2, in reinforced embankment	m <sup>2</sup>	55,533	42,844	77.1	

No.	WORK DESCRIPTION	UNIT	DESIGN	ACTUAL	%	REMARKS
<b>Bridges</b>						
3	Construction of Reinforced Concrete Bored Piles	ea	1,146	993	86.65	
	Bridges #1,#2,#3,#4, #5, #6, #7, #8, #9, #10, #11, Construction of Raft Foundations	unit	82	58	70.73	
	Bridges #1,#2,#3,#4, #5, #6, #7, #8, #9, #10, #11 Construction of Pier Columns	unit	164	114	69.51	
	Bridges #1,#2,#3,#4, #5, #6, #7, #8, #9, #10, #11 Construction of Cross Beams	unit	82	57	69.51	
	Bridges #1,#2,#3,#4, #5, #6, #7, #8, #9, #10, #11, 11.1, 11.2 Construction of Abutments bodies, Wing & Back Wall	unit	30	25	83.33	
	Bridges #1, #2, #3, #4, #5, #6 Concreting of cast-in-situ reinforced concrete slab	m <sup>3</sup>	2,721	2,721	100.00	
	Bridges #1, #2, #3, #4, #5, #6, #7, #8, #8A, #10 & #11. Installation of Pre-Cast Concrete Sidewalk	m	6,003	2,822.80	47.02	
	Bridges #1, #2, #3 and #4 Installation of transition slabs	m <sup>3</sup>	207	207	100.00	
	Bridge #7 Cast In-Situ Concrete Slab	m	480	480	100.00	
	Bridge #8 Cast In-Situ Concrete Slab	m	480	480	100.00	
	Bridge #10 Cast In-Situ Concrete Slab	m	480	400	83.33	Commenced May 01, 2015
	Bridge #11 Cast In-Situ Concrete Slab	m	920	600	65.22	Commenced (MSS) May 11, 2015
<b>Reinforced Concrete Culverts/Underpasses</b>						
4	Pipe culvert (pre-cast), d = 1.5 m	unit	41	32	78.05	
	Box culvert (pre-cast), 2.5 x 2.5 m, 4.0 x 2.5 m	unit	16	15	93.8	
	Cast-in-situ box underpass, 5.0 x 6.0 m, 4.0 x 4.0 m	unit	14	14	100	Corrugated Pipe #32
<b>Tunnels (Tunnel #1)</b>						
5	Excavation of Upper Soil Layer of Category V by Drilling and Blasting	100m <sup>3</sup>	18.80	8.40	44.7	
	Installation and removal of temporary support	Soil 100m <sup>3</sup>	282.57	73.18	25.9	
	Operation of Roadheader	Vehicle/hr	851.80	360.50	42.3	
	Drilling of Boreholes, applying of Anchorage (Ø25)	ton	35.53	0.96	2.70	
	Boring of holes D=60~125 in soil , Depth 6~13,5 m	100m	355.23	113.02	31.82	

No.	WORK DESCRIPTION	UNIT	DESIGN	ACTUAL	%	REMARKS
	Soil grouting with cement m-400 and water glass	m	35,523	11,237	31.63	
	Grating block concrete (1500x1500x400), fill improvement	100m <sup>2</sup>	21.58	13.56	62.8	
	Earth anchor construction(Φ105, Φ12.7mm x 4 strand, L=12m)	ea	562.00	491	87.4	
	Earth anchor construction(Φ105, Φ12.7mm x 4 strand, L=14m)	ea	111.00	111	100	
	Installation of FRP Pipes in the Opening D=Ø114mm	100m	190.44	70.20	36.86	
	Applying of Normal Shotcrete in the Main tunnel (t = 5cm, C20/25)	100m <sup>2</sup>	130.85	13.85	10.6	
	Installation of Permanent Steel Frames	ton	261.71	87.21	33.32	
	Applying of Normal Shotcrete in the main structure (t=25cm, C28/35)	100m <sup>2</sup>	83.95	20.95	25.0	
	Wire Mesh (100 X 100 X Ø4.8)	ton	56.24	21.90	38.94	
	Equipment for applying shotcrete (cement canon)	Vehicle/hour	1,456.86	858.25	58.91	
	Installation of FRP Pipes in the opening D = 60mm	100m	14.40	0.96	6.7	
	Ventilation	shift	874.29	430.29	49.22	
	Electric Lighting	shift	874.29	507.29	58.02	
<b>Tunnel No. 2</b>						
	Excavation of Soil, Category II by Excavator of 0.5m <sup>3</sup> capacity	1000m <sup>3</sup>	183.49	162.05	88.32	
	Removal of Soil	ton	165,138.26	145,847.14	88.32	
<b>Asphalt Pavement – Main Road</b>						
6	Provide and Construct Granular Subbase, 320mm thick	m <sup>3</sup>	70,127	36,994.50	52.75	
	Provide and Lay Granular Base Course, Compacted thickness 150mm	m <sup>2</sup>	181,014	95,167.47	52.57	
	Provide and Apply Prime Coat as specified including preparation of surface	m <sup>2</sup>	173,378	61,687.98	35.58	
	Provide and Lay Bituminous Base, compacted thickness 100mm	m <sup>2</sup>	172,678	60,403.71	34.98	
	Provide and apply Tack Coat as specified including preparation of surface	m <sup>2</sup>	171,989	35,867.41	20.85	
	Provide and Lay Asphalt Binder Course, compacted thickness 40mm.	m <sup>2</sup>	171,703	35,813.93	20.85	
	Provide and Apply Tack Coat as specified, including preparation of	m <sup>2</sup>	171,433	3,490.9	2.0	

No.	WORK DESCRIPTION	UNIT	DESIGN	ACTUAL	%	REMARKS
	surface					
	Provide and Lay Asphalt Surface Course, compacted thickness 40mm	m <sup>2</sup>	171,155	3,490.9	2.0	
<i>Asphalt Pavement – Ramps at Intersection</i>						
	Provide and Construct Granular Sub-base, 260mm thick	m <sup>3</sup>	22,807	2,630.97	11.54	
	Provide and Lay Granular Base Course Compacted thickness 150mm	m <sup>2</sup>	64,514	3,189.81	4.94	
	Provide, Lay and Compact Granular Material for shoulders	m <sup>3</sup>	15,540	121.3	0.8	
	Provide and apply prime coat as specified incl. preparation of surface	m <sup>2</sup>	60,609	5,552.44	9.20	
	Provide and Lay Bituminous Binder Course, compacted thickness 100mm	m <sup>2</sup>	60,253	5,169.19	8.60	
<i>Gravel Pavement – Local Roads</i>						
	Provide and Construct Granular Leveling Layer for Local Roads	m <sup>3</sup>	1,180	744.5	63.1	
	Provide and Construct Gravel Surface Layer for Local Roads	m <sup>3</sup>	1,048	239.2	22.8	

#### 1.4 Changes in project organization and environmental management team

Environmental monitoring is overseen by the Roads Department, through a special unit called the Environmental Protection Unit. This unit reviews the EIAs and EMPs related to the Roads Department projects and perform monitoring of compliance of the contractor's performance with the approved EMPs, EIAs, environmental standards and other environmental commitments of the contractor.

Environmental monitoring in the field is among the work scope of the Engineer (DOHWA), and the tasks of actual monitoring is undertaken by international environmental specialist and two (2) domestic environmentalists. The international environmental specialist is mobilized on an intermittent basis to undertake field audit and write-up the necessary periodic environmental report to the Employer (RD-MORDI) and Financier (ADB). A major work contribution of the international environmental specialist is to conduct seminars at the site for the Contractor's staff for a more efficient and effective implementation of measures.<sup>6</sup> Spot surveys and assessments of environmental situations and conditions of the project site were conducted to ascertain compliance of the Contractor to the EIA's EMP. Variances from the established baseline environmental parameters were noted and brought to the attention of the Contractor for corrective measures. Whenever necessary, certain modifications on the work program were recommended to assure compliance on the part of the Contractor (Sinohydro Company, China).

The Contractor had assigned an environmental, health and safety Director who would be responsible for environmental compliance based on the project EMP (found in the EIA). Likewise, the Contractor has to come up with its own EMP which served also as their guide for their own self-monitoring of the construction's environmental aspects. This is to ensure an efficient monitoring activity at all times.

Environmental issues arising from the construction activities should immediately be brought to the attention of the construction supervision team to coordinate efforts in order to immediately mitigate impacts, protect the environment, and safeguard the health and welfare of the local communities. All these are to be conducted within the framework of the overall construction management and supervision. Aspects in the environmental monitoring are reported in a monthly, quarterly and bi-annual basis to the RD (PIU) and ADB. The applied environmental monitoring work coordination set-up for the Project road is represented in Figure 2 below.

In the reporting period, no changes have been taken place in respect of project organization and environmental management team.

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<sup>6</sup> DOHWA International Environmental Specialist Courtney E. McCall had conducted one (1) HSE seminar in April 2014.

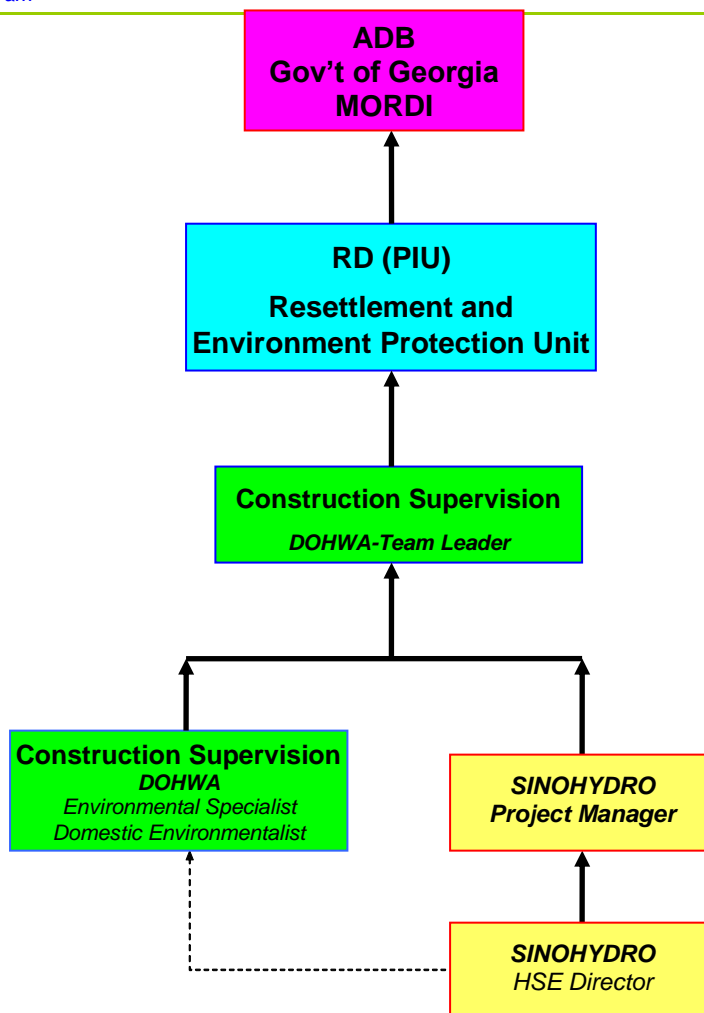


Figure 2: Environmental Monitoring Work Coordination Set-Up



## PART II: ENVIRONMENTAL MONITORING

As stated in the Environmental Monitoring Plan of the EIA Report<sup>7</sup> the Contractor should undertake quarterly parametric monitoring of (i) noise and vibration; (ii) surface water quality; (iii) drinking water quality; and (iv) air quality.

### 2.1 FRAMEWORK FOR ENVIRONMENTAL MONITORING

With reference to MFF 0034-GEO: Road Corridor Investment Program - Environmental Assessment and Review Framework<sup>8</sup>, it is stated that “an EMP will be part of the overall project monitoring and supervision, and will be implemented by the Contractor with oversight from the Supervision Consultant (the Engineer) and PMU. Progress on the preparation and implementation and compliance of an EMP (Contractor’s EMP) will be included in the periodic project progress reports. Specific monitoring activities defined in the IEEs or EIAs and EMPs will be carried out by the contractor and monitored by the PMU. RD will submit reports on EMP implementation to ADB for every six months to Category A and B sensitive projects and annually for Category C projects”.

The environmental monitoring and management activities for the project is based on the Environmental Impact Assessment (EIA) Reports drafted for the project road component namely the Environmental Impact Assessment Report. ADB Loan No. 2560-GEO - Road Corridor Investment Program (Tranche 1) - Kobuleti Bypass, Kobuleti-Batumi Section and Batumi Bypass Design Project. This EIA report applies to the sections where construction is ongoing. Based on the EIA’s EMP (See Annex V for the EMP prepared for the Construction Phase) the environmental concerns which need to be monitored and managed are as follows:

**Table 3: Environmental Aspects for the Management and Monitoring**

Environmental Aspect	Subtopics
1. Management Plan for Protection of Ispani Mire and Swampy Soils (Km 4.76 to Km 8.5)	1.1 Hazardous material storage sites
	1.2 Earth works
	1.3 Erosion and drainage
2. Protection of Flora	2.1 Endangered species
	2.2 Vegetation clearance
3. Protection of Fauna	3.1 Construction activities
	3.2 Poaching
4. Protection Fisheries	4.1 Construction of Bridge Substructure
	4.2 Construction works in the rivers and on the surrounding lands.
5 Waste Management	5.1 General Waste
	5.2 Spoil
	5.3 Hazardous Waste
6. Fuels and Hazardous Goods Management	6.1 Fuels and hazardous goods.
7. Water Resources Management	7.1 Hazardous Material and Waste
	7.2 Discharge from construction sites
	7.3 Construction of Bridges/drainage structures in streams/rivers

<sup>7</sup> Government of Georgia. MORDI-Department of Roads. February 2012. Environmental Impact Assessment

<sup>8</sup> ADB. Updated on December 2011. MFF 0034-GEO: Road Corridor Investment Program - Environmental Assessment and Review Framework



Environmental Aspect	Subtopics
	7.4 Soil Erosion and siltation
	7.5 Construction activities in water bodies
8. Drainage Management	8.1 Excavation and earth works, and construction yards
	8.2 Fresh road cuts may immediately trigger intensive erosion during construction and drastic increase of sedimentation
	8.3 Ponding of water
9. Soil Quality Management	9.1 Earth filling with borrow material
	9.2 Storage of hazardous and toxic chemicals
10. Top Soil Management Plan	10.1 Land clearing and earth works
11. Topography and Landscaping	11.1. Land clearing and earth works
12. Borrow Areas Development & Operation	12.1 Degradation of borrow areas
13. Air Quality Management	13.1 Construction vehicular traffic
	13.2 Construction machinery
	13.3 Construction activities
14. Noise and Vibration Management	14.1 Construction vehicular traffic
	14.2 Construction machinery
	14.3 Construction activity
15 Road Transport and Road Traffic Management	15.1 Construction vehicular traffic
16. Construction Camp Management	16.1 Siting and Location of construction camps
	16.2 Construction Camp Facilities
	16.3 Disposal of waste
	16.4 Fuel supplies for cooking and heating purposes
	16.7 Site Restoration
17. Cultural and Religious Issues	17.1 Construction activities near religious and cultural sites
18. Worker Health and Safety	18.1 Anthrax
	18.2 Best practices
	18.3 Water and sanitation facilities at the construction sites
	18.4 Trainings

In addition, the following laws and regulations are also considered and used as legal and regulatory framework related to road construction activities of the Contractor:

1. On Waste Management: (i) Approval of the rules of collection, storage and neutralization of the wastes of preventive treatment establishments” 16 August of 2001, 300 (“Georgian Legislative Messenger” N90 24/08/2001) (ii) “Approval of arrangement of polygon/grounds for disposal of solid household wastes and adoption of sanitary rules and norms” 24 February, #36 (Georgian Legislative Messenger #17, 07.03.03)
2. Georgian Law on Ambient Air Protection
3. Law of Minerals, 1996
4. Wildlife Law, 1996
5. Law of Georgia “On the System of the Protected Areas, 1996
6. Law of Georgia on creation and management of Kolkheti protected areas
7. Law of Georgia ‘On the Red List and Red Book’, 2003
8. Law of Georgia ‘On the Red List and Red Book’, 2003
9. Law of Georgia on Cultural Heritage, 2007

10. Environmental Standards and Norms: (i) Ambient Air Quality Norms; (ii) Noise Standards;

For the ambient air quality, the guidelines are as shown below<sup>9</sup>:

**Table 4: Ambient Air Quality Guidelines in Georgia**

Parameter	Maximum Admissible Concentrations (MAC) mg/m <sup>3</sup>	Averaging Time
Nitrogen Dioxide (NO <sub>2</sub> )	0.085	30 minutes
	0.04	Annual
Sulfur Dioxide	0.5	30 minutes
	0.05	24 hours
Carbon Monoxide	5.0	30 minutes
	3.0	24 hours
Soot (PM)	0.5	30 minutes
	0.15	24 hours

Also in terms of the noise quality standards for residential areas the following guidelines are adopted<sup>10</sup>:

**Table 5: Georgian Noise Quality Standards in Residential Areas**

Time	Indicative Level (dBA)	Maximum Admissible Level (dBA)
7am – 11 pm	55	70
11pm – 7am	45	60

<sup>9</sup> Government of Georgia. MORDI-Department of Roads. July 2012. Environmental Impact Assessment Road Corridor Investment Program (Tranche 1) Kobuleti Bypass, Kobuleti-Batumi Section and Batumi Bypass Design Project

<sup>10</sup> Ibid

## 2.3 SUMMARY OF PERFORMED ENVIRONMENTAL MONITORING ACTIVITIES

Within the previous six (6) months, from July to December 2015, the Engineer's two (2) domestic environmentalists have been performing environmental monitoring as outlined in the EIA Report. The results of the monthly monitoring were incorporated in the Environmental Chapter of the monthly report of the Engineer. In early January 2015, the International Environmental Specialist was mobilized to the site to undertake HSE audit. Correspondingly, a Biannual Environmental Monitoring Report covering the period from July to December 2015 was drafted to be submitted to the Employer and the ADB.

Primarily the environmental monitoring activities at various locations at the worksites focused on (i) the quality of atmospheric air; (ii) the quality of drinking water and river water; (iii) the condition of soil; (iv) flora and fauna; (v) the condition of construction equipment and transport; (vi) waste management; and (vii) worker safety, general hygiene and sanitation.

The Contractor carried out instrumental measurements for air quality and noise from thru July to December 2015. Measurement of surface water and groundwater quality was carried out in July and September 2015. Water quality measurements should be carried out on a quarterly basis, especially for groundwater in camp sites as this has direct impact on the health of the work personnel. The monthly environmental parameter measurements and observations are summarized below.

- (i) **Air quality** – Particulate matter only (PM); no measurements conducted for Sulphur Dioxide, Nitrogen Oxide, and Carbon Monoxide. Apart from PM, the latter parameters should be monitored on a quarterly basis, as specified in Table 7-2 of EIA/EMP.

The average PM measurements for each of the six months in Lot 2 (Table 6) monitored during the reporting period in 2015 indicate that the concentrations are below the threshold levels.

**A PC-3A respirable dust detector was used to measure the particulate data collected.**

**Table 6: PM Measurements (average values in mg/ m<sup>3</sup>) at selected sites in Lot 2 for July-Dec 2015**

SI No.	Location	MA C	Baseline Data	July	Aug	Sep	Oct	Nov	Dec
1	Choloki Camp Site 1	0.5	0.046	0.003	0.002	0.022	0.016	0.019	0.030
2	PK 86 / Ochkhauri Camp site 2	0.5	0.04	0.016	0.017	0.012	0.015	0.019	0.021
3	Laituri Campsite	0.5	0.048	0.012	0.017	0.013	0.026	0.021	0.028
4	BR1 (PK5+20)	0.5	0.016	0.009	0.011	0.019	0.021	0.020	0.028
5	BR2 (PK16+82)	0.5	0.013	0.013	0.013	0.027	0.022	0.021	0.018
6	BR3 (PK43+73)	0.5	0.013	0.013	0.015	0.024	0.023	0.021	0.041
7	BR4 (PK44+84)	0.5	0.014	0.014	0.015	0.024	0.025	0.021	0.040
8	BR5 (PK54+21)	0.5	0.015	0.014	0.016	0.021	0.023	0.021	0.016
9	BR6 (PK59+05)	0.5	0.015	0.015	0.015	0.024	0.022	0.022	0.023
10	BR7 (PK68+60)	0.5	0.015	0.016	0.015	0.029	0.025	0.023	0.017
11	BR8 (PK81+73)	0.5	0.016	0.015	0.017	0.019	0.019	0.021	0.019
12	BR8A	0.5	NA	0.021	0.017	0.014	0.019	0.023	0.023
13	Bobokvati Campsite	0.5	0.021	0.013	0.014	0.018	0.021	0.022	0.019

SI No.	Location	MA C	Baseline Data	July	Aug	Sep	Oct	Nov	Dec
	#4								
14	BR9 (PK)	0.5	0.036	0.012	0.014	0.016	0.021	0.023	0.042
15	BR10(PK)	0.5	0.040	0.017	0.020	0.019	0.020	0.020	0.024
16	BR11 (PK)	0.5	0.039	0.016	0.018	0.029	0.023	0.017	0.033
17	BR11.1 (PK)	0.5	0.030	0.013	0.016	0.024	0.023	0.013	0.023
18	BR11.2 (PK)	0.5	0.027	0.015	0.016	0.016	0.023	0.016	0.034
19	Chakvi Campsite #5	0.5	0.039	0.015	0.015	0.020	0.025	0.025	0.047

Baseline data established in May 2013 (for Bridges 1-8a) and March 2014 (for Bridges #9-13 and Chakvi Campsite #5).

(ii) **Noise Level** – only sites with active construction was taken for noise measurements. All noise measurements during the reporting period of July-December 2015 were made through replicate samples, while the instrument was calibrated prior to obtaining measurements at a particular site. As evident from the average noise measurements for each of the six months in Lot 2-Section (Table 7), exceedance of noise levels was not documented in any of the sites monitored during the reporting period.

**Baseline measurements for noise readings were collected in March 2014 at land adjacent to Bridges 9, 10, 11, 12 and 13 and at Chakvi Campsite #5. This data is listed in Table 7. (A Hengsheng HS-5633 noise detection meter was used to collect the decibel readings).**

**Table 7: Noise Measurements (Average dB) at selected sites in Lot 2 for July-Dec 2015**

SI No.	Location	Allowable Limit	Baseline Data <sup>1</sup>	July	Aug	Sep	Oct	Nov	Dec
1	Choloki Camp Site 1	75-80	72	52.7	53.2	50.6	54.3	55.5	55.1
2	PK 86 / Ochkhauri Camp site 2	75-80	75	52.6	53.0	57.3	54.5	54.8	54.2
3	Laituri Campsite	75-80	75	51.6	51.9	61.5	64.4	59.1	62.6
4	BR1 (PK5+20)	75-80	60.0	55.2	57.2	61.2	57.1	56.0	59.3
5	BR2 (PK16+82)	75-80	62.1	57.5	55.0	56.4	60.3	57.5	60.4
6	BR3 (PK43+73)	75-80	65.3	57.5	57.5	60.2	57.8	57.3	59.5
7	BR4 (PK44+84)	75-80	65.3	57.5	57.3	59.8	57.4	57.1	60
8	BR5 (PK54+21)	75-80	62.2	56.5	57.5	63.4	58.0	57.1	58.6
9	BR6 (PK59+05)	75-80	66.1	61.4	57.4	64.1	57.5	60.3	58.5
10	BR7 (PK68+60)	75-80	59.3	54.9	59.5	57.5	62.7	58.0	62.7
11	BR8 (PK81+73)	75-80	60.6	57.7	56.8	55.0	64.4	62.5	61.1
12	BR8A	75-80	NA	57.5	57.5	60.1	63.7	62.9	56.4
13	Bobokvati Campsite #4	75-80	64.5	57.5	55.7	63.7	57.3	57.5	55.1
14	BR9 (PK)	75-80	57.7	55.2	56.8	49.1	57.4	56.2	61.8
15	BR10(PK)	75-80	64.1	62.1	62.3	56.1	62.5	62.5	53.4
16	BR11 (PK)	75-80	66.9	62.5	62.6	59.1	62.9	64.3	57.9
17	BR11.1 (PK)	75-80	62.4	54.4	57.6	58.7	56.2	57.4	63.7

SI No.	Location	Allowable Limit	Baseline Data <sup>1</sup>	July	Aug	Sep	Oct	Nov	Dec
18	BR11.2 (PK)	75-80	58.3	58.2	57.2	53.7	62.4	57.2	59.5
19	Chakvi Campsite #5	75-80	66.9	56.5	56.3	63.3	57.1	57.5	55.1

<sup>1</sup>Baseline data established in May 2013 (for Bridges 1-8a) and March 2014 (for Bridges #9-13 and Chakvi Campsite #5).

(iii) **Ground Water Quality** - Ground water samples were obtained from the five campsites and tested for potable water quality parameters in October 2015.

**Table 8: Potable / Ground Water Quality Measurements in Campsites (Oct 2015)**

Parameter	Acceptable Limits	Standard	Choloki	Chakvi*	Ochkhamuri	Laituri	Bobokvati
Odor	2 units	ISO6658	0	0	0	0	0
Taste	2 units	ISO6658	0	0	0	0	0
Color	15°	ISO7887	15°	15°	15°	15°	15°
Turbidity	3.5 units	ISO7027	0.5	0.5	2	0.5	0.5
pH	6.0-9.0	ISO10523	7.88	7.93	7.47	7.83	7.0
Chloride	250 mg/l	ISO9297	24.5mg/l	19.6mg/l	24.0mg/l	19.6mg/l	12.7mg/l
Ammonia NH3	2.0 mg/l	ISO11905.1	0.6mg/l	<0.05	<0.05	0.7	<0.05
Nitrite (NO2-)	0.2 mg/l	GOST4192	<0.003	<0.03	<0.003	<0.003	<0.003
Nitrate (NO3-)	50.0 mg/l	GOST18826	<0.1	0.1mg/l	0.2	<0.1mg/l	0.1mg/l
Total Iron (Fe)	0.3mg/l	ISO6332	0.16mg/l	<0.04mg/l	<0.041mg/l	<0.11mg/l	<0.07mg/l
Total Copper (Cu)	2.0 mg/l	ISO8288	0.04mg/l	<0.04mg/l	<0.04mg/l	<0.04mg/l	<0.04mg/l
Arsenic (As)	0.01mg/l	GOST4152	<0.005	<0.005	<0.005	<0.005	<0.005
Lead (Pb)	0.01mg/l	ISO8288	0.001	0.004	0.001	0.01	0.01
Dry residue (TDS)	1000-1500mg/l	GOST18164	200mg/l	80mg/l	120.0mg/l	160.0mg/l	80.0mg/l
Permanganate index (COD)	3.0 mg/O <sub>2</sub> /l	ISO8467	1.72 mg/O <sub>2</sub> /l	1.45 mg/O <sub>2</sub> /l	0.71 mg/O <sub>2</sub> /l	1.69 mg/O <sub>2</sub> /l	1.80 mg/O <sub>2</sub> /l
Mesophylic aerobic and facultative anaerobic microorganism	37°- ≤20 CFU 22°- ≤100 CFU (in100ml)	ISO6222	60 90	18 25	80 100	50 85	60 120
Coliform	in 300ml	ISO9308	Yes	NO	No	Yes	Yes
Ecole	In 300ml	ISO9308	No	NO	No	NO	NO
Excrements	In 250ml	ISO7899-2	No	No	No	No	No
Salmonella	In 100ml	ISO6340	No	No	No	No	No

(iv) **Surface Water Quality** - Surface water samples were obtained in five rivers crossing the Lot 2 area and tested for selected surface water quality parameters in October 2015. Samples were collected from one location along the Dekhva, Kintrishi, Kinkishi, Achkva and Shuagele Rivers. The analytical results of the samples collected in October 2015 (see Table 9) indicate that the water quality parameters were within the regulated limits for all five rivers.

**Table 9: Surface Water Quality in Lot 2 Rivers (January 2014)**

Parameter	Acceptable limits <sup>1</sup>	Standard	Kintrishi, Bridge #4 <sup>^</sup>	Kinkishi Bridge #5	Achkva	Dekhva Bridge #7	Dekhva Bridge #8	Shuagele
Odor	1 unit	ISO 6658	0 (none)	0 (none)	0 (none)	0 (none)	0 (none)	0 (none)
Color	25°	ISO 7887	15°	10°	10°	15°	15°	15°
Turbidity	3.5 units	ISO 7027	0.1mg/l	0.5mg/l	1.0mg/l	1.0mg/l	0.8mg/l	1.0mg/l
pH	6.5-8.5	ISO 10523	8.68	9.34	8.03	9.38	8.37	7.96
Dry residue (TDS)	1000mg/l	GOST 18164	80mg/l	80mg/l	120mg/l	80mg/l	80mg/l	80mg/l
Permanganate Index (COD)	4-6mg/O <sub>2</sub> /l	ISO 8467	1.84mg/O <sub>2</sub> /l	2.59mg/O <sub>2</sub> /l	2.47mg/O <sub>2</sub> /l	3.68mg/O <sub>2</sub> /l	2.0mg/O <sub>2</sub> /l	2.51mg/O <sub>2</sub> /l
Chloride Cl <sup>-</sup>	300mg/l	ISO 9297	8.82mg/l	10.78mg/l	14.7mg/l	12.7mg/l	4.0mg/l	13.7mg/l
Sulfide SO <sub>4</sub> <sup>-2</sup>	250mg/l	ISO 9280	4.0mg/l	1.0mg/l	3.0mg/l	4.0mg/l	4.0mg/l	4.0mg/l
Nitrite NO <sub>2</sub> <sup>-</sup>	0.08-3.3mg/l	GOST 4192	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate NO <sub>3</sub> <sup>-</sup>	40-45mg/l	GOST 18826	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l
Total Iron (Fe)	0.3mg/l	ISO 6332	0.1mg/l	0.01mg/l	0.06mg/l	0.11mg/l	0.15mg/l	0.12mg/l
Lead (Pb)	0.03-1mg/l	ISO 8288	NA	NA	NA	NA	NA	NA
Zinc (Zn)	1mg/l	GOST 4974	0.004mg/l	0.002mg/l	0.06mg/l	0.002mg/l	0.002mg/l	0.003mg/l
Arsenic (As)	0.05mg/l	GOST 4152	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

(v) **Environmental Issues** - The issues encountered in the previous three months were obtained from the Environment Chapter of the monthly progress reports, and summarized as follows:

**Table 10: Some Observed and Reported Environmental Issues/Aspects**

Environmental Concerns	Observed Environmental Issues/Aspects
Atmospheric Air Quality	<ul style="list-style-type: none"> <li>➤ Annual monitoring of SO<sub>2</sub>, CO, NO<sub>2</sub> has not been carried out.</li> <li>➤ Severe dust emissions along Lot 2 road affecting residents (especially by bridge #7)</li> </ul>
Quarry areas	<ul style="list-style-type: none"> <li>➤ Reinstatement works of several quarry sites has not yet</li> </ul>

Environmental Concerns	Observed Environmental Issues/Aspects
	carried out by the Contractor (October – December, 2015)
General hygiene in campsites/Waste management	➤ Garbage, construction waste, timber are scattered around Bobokvati and Chakvi Campsites (October – December 2015).
Construction scrap material improperly stored	➤ Scarp material scattered in Bobokvati and Chakvi campsites (August – December 2015).
Soil destabilization	➤ Exposed/eroded embankment in some sections of Lot 2 road section (July - December 2015 Report)
Stray dogs and cattle walk at the territory of construction campsites	➤ Stray dogs and cattle were observed at the territory of campsites, which has negative impact on health of personnel creating risk of spreading diseases.
Contamination of adjacent territory	➤ During tunnel construction works material taken from sediment trap was disposed improperly. Instead of transporting material in the fill Contractor's staff dumped it in the nearby valley.



## PART III: ENVIRONMENTAL MANAGEMENT

### 3.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The Environmental Management Plan (EMP) was designed to avoid, reduce, or at least minimize the adverse environmental impacts that could result from the activities during the implementation and operation of the project. As per the Technical Specification **3001.1 ENVIRONMENTAL MANAGEMENT PLANNING**, “The Contractor shall provide a detailed site-specific (or section-specific) Environmental Management Plan (EMP) which will be based on: (1) Generic/standard EMP structure and mitigation measures for the road construction; (2) Site/section-specific EMP requirements provided by the Employer in his EIAs. Hence, one major requirement is that the Contractor should produce his own EMP appropriate for the project and to be checked by the Engineer’s environmental specialist. Two separate EIA reports, including detailed EMPs have been prepared for Lot 1 and Lot 2 areas. At the time this biannual report was submitted, an EIA for Lot 2 (km 16+500-km 18+860) was being finalized, reflecting the road alignment change in that particular section of Lot 2.

For the drafting of the SSEEMPs, the Contractor was advised to adopt the provisions in the EIA Technical Specifications and to undertake monitoring of important parameters found in the Lot 1 EIA Report Table 7-2, and Lot 2 EIA Report Table 9-2: Environmental Monitoring Plan during Construction and Operation. Parametric measurements should be done on a quarterly basis for air quality, noise, surface and groundwater quality and corresponding reports prepared and submitted to the Engineer.

### 3.2 Site Inspections and Audits

As a matter of protocol, site inspections were conducted on various environmental aspects of the project and form part of the Monthly Progress Report. Regular inspections were undertaken by local environmental specialists and more intensive audits on specific sites were carried out by the International Environmental Specialist for Quarterly and Bi-annual Reporting. During the inspections, several environmental health and safety issues were observed and noted. These issues were subsequently brought to the attention of the personnel concerned on the Engineer’s side as well as discussed with the Contractor’s side following the “Auditing Protocol” and EMMP. The main HSE issues observed were generally concerning with the improper storage of material in camp sites, accumulation of scrap material in campsites, soil contamination issues, dust emissions, water quality of potable water systems, sedimentation of surface water bodies from construction earthwork in Lot 2 road, as well as worker safety issues.

During the monitoring period a number of HSE issues were noted and brought to the attention of the Contractor. The Contractor’s HSE Director and/or his representative, and local environmental specialists carried out inspections along the road stretch under construction, camp sites, and quarry sites. Based on the observations made, **Environmental Action Plan** was drafted and mitigation measures were jointly discussed to be implemented within the specified time frames. The unfulfilled mitigation measures and/or unsatisfactory conditions were discussed with the Contractor HSE representatives for mitigation. A summary of the identified issues is presented in the ensuing Table.



**Table 11: Observed HSE Issues and Recommendations of the Environmental Specialist**

**(A) Road Section Lot 2, 12.4 Km up to 28 Km**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
Dust from construction vehicles in dry weather	<ul style="list-style-type: none"> <li>➤ Implement air quality management according to requirements of specification                             <ul style="list-style-type: none"> <li>○ Spray water along the road at least twice daily during dry weather days</li> </ul> </li> </ul>	Continuously (when necessary)	<p>Executed</p> <p>(Spraying of water initiated as recommended in dry weather.)</p>
Household waste is scattered around construction bridges, road sections and tunnel.	<ul style="list-style-type: none"> <li>➤ Trash containers should be placed at the mentioned territories</li> </ul>	2-3 weeks	<p>In progress</p> <p>(Placement of garbage containers at the construction sites is planned)</p>
At the tunnel #1 construction of toilet and sedimentation trap for the technical water (produced from the construction activities of the tunnel) is not completed. Household waste is scattered at the tunnel construction site.	<ul style="list-style-type: none"> <li>➤ Construction of toilet should be completed</li> <li>➤ Sedimentation trap with 3 section for the technical water should be constructed</li> <li>➤ Placement of garbage containers is necessary</li> </ul>	2-3 weeks	<p>Executed</p> <p>(Construction of the sedimentation trap and toilet is completed. Garbage containers are placed.)</p>

**(B) Choloki Camp Site**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
<b>Scrap Material in Campsite</b>			
Used construction scrap material, steel, timber, wires and useless machinery are scattered at the site.	<ul style="list-style-type: none"> <li>○ Scrap materials scattered in camp should be collected and disposed/sold to outside material haulers and recyclers.</li> <li>○ Impaired machines and used spare parts should be gathered, and inventoried for repair/sold as scrap.</li> </ul>	1 month	<p>Partially Executed</p> <p>As the mentioned process before ending of the construction activities is presenting constant circle the issue requires continuous activity.</p>
<b>Waste management issues in campsites</b>			
Overflowing garbage containers in campsite	➤ Timely removal of waste from the campsite is necessary	<p>On a regular basis</p> <p>(Four times a month)</p>	<p>Executed</p> <p>(Based on agreement documented with the special company removal of waste on a regular bases has been initiated)</p>
Coliform bacteria have been revealed in the potable water, which indicates on potential contamination of water by the excrements.	<ul style="list-style-type: none"> <li>➤ The main water tank should be washed out and chlorinated</li> <li>➤ For drinking and cooking should be used boiled water</li> <li>➤ Sewage line should be checked on leakage</li> <li>➤ Clean up inner and outer drainage channels of the campsite</li> <li>➤ Water samples should be taken repeatedly after cleaning in 2 weeks</li> </ul>	Water tank should be washed out and chlorinated immediately on a weekly bases	<p>In progress.</p> <p>The Contractor expressed readiness concerning installation of new water tanks</p>

**(C) Ochkhamuri Camp Site**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
<b>Soil Contamination Issues</b>			
Open drums with waste oil ;  A large patch of leaked oil is presented near asphalt production plant after dismantling of it	➤ Clean oil spills on camp site.	1 Week	Executed  Patch of contaminated soil is removed and filled up with gravel
<b>Material Storage Issues</b>			
Used construction scrap material (steel, timber, wires, etc.) were improperly stored at the site.	➤ Scrap materials scattered in camp should be collected and disposed/sold to outside material haulers and recyclers	2-3 Weeks	In progress  As the mentioned process before ending of the construction activities is presenting constant circle the issue requires continuous activity.

**(D) Laituri Crushing Plant**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
Overflowing garbage containers in campsite	➤ Timely removal of waste from the campsite is necessary	On a regular basis  (Four times a month)	In progress  (Based on agreement documented with the special company removal of waste on a regular bases has been initiated)

**(E) Bobokvati Camp Site (Lot 2 area)**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
<b>General Sanitary Issues</b>			
Water boiler, toilet lockers, flushers are malfunctioned and light bulbs are burnt.	<ul style="list-style-type: none"> <li>➤ All the above mentioned should be changed or repaired</li> </ul>	1 week	Executed
Coliform bacteria have been revealed in the potable water, which indicates on potential contamination of water by the excrements.	<ul style="list-style-type: none"> <li>➤ The main water tank should be washed out and chlorinated</li> <li>➤ For drinking and cooking should be used boiled water</li> <li>➤ Sewage line should be checked on leakage</li> <li>➤ Clean up inner and outer drainage channels of the campsite</li> <li>➤ Water samples should be taken repeatedly after cleaning in 2 weeks</li> </ul>	Coliform bacteria have been revealed in the potable water, which indicates on potential contamination of water by the excrements.	<ul style="list-style-type: none"> <li>➤ The main water tank should be washed out and chlorinated</li> <li>➤ For drinking and cooking should be used boiled water</li> <li>➤ Sewage line should be checked on leakage</li> <li>➤ Clean up inner and outer drainage channels of the campsite</li> <li>➤ Water samples should be taken repeatedly after cleaning in 2 weeks</li> </ul>
Puddles of stagnant water at the campsite territory	<ul style="list-style-type: none"> <li>➤ Fill stagnant water puddles with gravel and reshape</li> </ul>	2 week	Executed  (Puddles with stagnant water are filled with gravel)
<b>Material Storage Issues</b>			
Used construction scrap material (steel, wood, wires, etc.) were improperly stored at the site.	<ul style="list-style-type: none"> <li>➤ Scrap materials should be stored in an orderly manner to be reused, and disposed/sold to outside material haulers and recyclers. Useful materials should be stored properly according to types.</li> </ul>	2-3 weeks	In progress  (At some places issue is resolved, but at other places issue still remains)

**(F) Chakvi Camp Site (Lot 2 area)**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
<b>General Sanitary Issues</b>			
<p>Garbage container is not placed at the vehicle maintenance area in campsite. Waste oil filters are thrown in to the adjacent channel and create potential contamination threat to water by oil products.</p> <p>Sedimentation pond near the batching plant should be cleaned up from the silt</p>	<ul style="list-style-type: none"> <li>➤ Placement of garbage container to each vehicle maintenance area is necessary. Waste oil filters should not be thrown in to the channel or outdoor in open</li> <li>➤ Clean the waste bitumen leaked on ground</li> </ul>	<p>2-3 Week</p>	<p>Executed</p> <p>(Channel is cleaned up from waste, garbage container is placed and sedimentation trap is cleaned )</p>
<b>Scrap Material in Campsite</b>			
<p>Piles of metal scrap material scattered in campsite</p>	<ul style="list-style-type: none"> <li>➤ Scrap materials scattered in camp should be collected and disposed/sold to outside material haulers and recyclers.</li> <li>➤ Used and unused materials should be stored separately in proper manner</li> </ul>	<p>2-3 weeks</p>	<p>Partially executed</p> <p>As the mentioned process before ending of the construction activities is presenting constant circle the issue requires continuous activity.</p>

**Table 12: Action plan and mitigation measures for the upcoming period**

**(A) Main road Sections**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
<b>Waste management issues in campsites</b>			
Contractor did not carried out reinstatement works of the quarry site located at the territory of village Shuaghele	➤ The Contractor should request Environmental Department of Adjara to extend the deadline for reinstatement of the Quarry	March-April, 2016	
Exposed embankment sections are not filled with sand and gravel and humus layer is not spread	➤ Exposed Embankment sections must be filled with sand and gravel. Follow-up humus layer must be spread and grass must be seeded	February-March, 2016	
Grass and bushes were not seeded at the sections of the cut strengthened by Gabion walls, that may cause destabilization of cut.	➤ Contractor must seed grass and bushes at slopes of cuts	March-April, 2016	

**(B) Choloki Camp Site**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
<b>Waste management issues in campsites</b>			
Drinking water tank was not cleaned regularly that had negative impact on the quality of drinking water	➤ The main water tank should be washed out and chlorinated minimum once a yea	January	

**(C) Ochkhamuri Camp Site**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
<b>Waste management issues in campsites</b>			
Drinking water tank was not cleaned regularly that had negative impact on the quality of drinking water	Drinking water tank was not cleaned regularly that had negative impact on the quality of drinking water	Drinking water tank was not cleaned regularly that had negative impact on the quality of drinking water.	Drinking water tank was not cleaned regularly that had negative impact on the quality of drinking water.

**(D) Laituri Crushing Plant**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
Drinking water tank was not cleaned regularly that had negative impact on the quality of drinking water	➤ The main water tank should be washed out and chlorinated minimum once a yea	January, 2016	

Sediment traps were not regularly cleaned	➤ Sediment traps should be regularly cleaned. Taken material should be disposed in the fill.	January – February, 2016	
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**(E) Bobokvati Camp Site (Lot 2 area)**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
<b>General Sanitary Issues</b>			
Drinking water tank was not cleaned regularly that had negative impact on the quality of drinking water	➤ The main water tank should be washed out and chlorinated minimum once a year	January, 2016	
Sediment traps of concrete plant are not functioning	➤ Sediment traps should be repaired	January – February, 2016	
Sediment traps were not regularly cleaned	➤ Sediment traps should be regularly cleaned. Taken material should be disposed in the fill.	January – February, 2016	
<b>Material Storage Issues</b>			
Used construction material (steel, wood, wires, etc.) were improperly stored at the site.	➤ Materials should be stored in an orderly manner to be reused, and disposed/sold to outside material haulers and recyclers. Useful materials should be stored properly according to types.	January – February, 2016	
Big amount of scrap material is accumulated	➤ Scrap Materials should be disposed/sold to outside material haulers and recyclers.	January – February, 2016	



**(F) Chakvi Camp Site (Lot 2 area)**

EHS Issues	Recommended Mitigation Measures	Response Time	Progress
<b>General Sanitary Issues</b>			
Drinking water tank was not cleaned regularly that had negative impact on the quality of drinking water	➤ The main water tank should be washed out and chlorinated minimum once a year	January, 2016	
Sediment traps were not regularly cleaned	➤ Sediment traps should be regularly cleaned. Taken material should be disposed in the fill.	January – February, 2016	
<b>Material Storage Issues</b>			
Used construction material (steel, wood, wires, etc.) were improperly stored at the site.	➤ Materials should be stored in an orderly manner to be reused, and disposed/sold to outside material haulers and recyclers. Useful materials should be stored properly according to types.	January – February, 2016	
Big amount of scrap material is accumulated	➤ Scrap Materials should be disposed/sold to outside material haulers and recyclers.	January – February, 2016	

### 3.3 Summary of HSE Observations at Specific Locations

Based on the HSE audits, inspections and re-inspection of HSE mitigation measures implemented, the main observations made by the International Environmental Specialist at different locations of the Project area are summarized below:

#### 3.3.1 Lot 1 Road Stretch (0.0 – 12.4 Km, and 30+250 Km)

The construction of the Lot 1 road stretch (0.0 – 12.4 km) was completed and officially handed over to the Roads Department in late October 2013.

Positive Interventions Observed	Main EHS Issues Observed
Rehabilitation of new road embankment with top soil. New vegetative growth visible.	Gaps (5-6 feet) between guard rails and bridge locations allow domestic animals (cattle, horses etc.) to enter the road, which could pose accident hazards for vehicles.
	Slope stabilization needed above gabion walls needed along km 30-33 stretch.

#### 3.3.2 Lot 2, Section 1 and Section 2 Road Stretch (12.4 – 25 Km)

The earthworks, bridge and culvert construction work and filling of road with aggregate material are currently in progress.

Positive Interventions Observed	Main EHS Issues Observed
Sediment ponds in bridge construction areas.	Slopes are not protected from land sliding
New topsoil spread on embankments between Kintrishi and Kinkishi Rivers.	Lack of silt fences and sediment barriers in earthworks adjoining rivers to protect surface water bodies from sedimentation.
River embankments reinforced with concrete.	
Temporary access road in Kintrishi river removed to facilitate flow	

#### 3.3.3 Choloki Camp Site

Positive Interventions Observed	Main EHS Issues Observed
Tire piles and other scrap material stored in orderly fashion around rear perimeter of the facility, delineating a border.	Poor sanitary conditions – clogged ditches with garbage and scrap material, some drains littered with household waste.
Expanded concrete pad under above ground storage gas storage tanks and clean area surrounding them.	
New mobile fire extinguishers kept near storage room	

#### 3.3.4 Ochkhauri Camp Site

This campsite operates an asphalt plant. Workers quarters, a food serving area and offices are also on site.

Positive Interventions Observed	Main EHS Issues Observed
Large pile of waste bitumen bags cleared from campsite.	Poor sanitary conditions – stagnant water, scattered garbage/used material/debris etc.
	Haphazard storage of scrap metal piles accumulated in camp grounds
	Rubber conduit not fully covering exposed wires on wiring on the ground.

### 3.3.5 Bobokvati Camp Site

This campsite has been established to facilitate construction work in the Lot 2 area, and consists of a steel fabrication unit, concrete mixing plant, welding unit, offices, food serving area, and workers quarters. The Dehkva River flows behind the campsite.

Positive Interventions Observed	Main EHS Issues Observed
Hazard communication signage posted.	Garbage/trash scattered in campsite.
Improved usage of PPE.	Used scrap material, and timber/wood planks scattered in campsite.
Machine guards for safety.	Poor drainage in camp grounds.
	Stray cattle

### 3.3.6 Chakvi Camp Site

This campsite has been established to facilitate work in the Lot 2 area, and was opened during first quarter of 2014. It includes offices, workers quarters, cafeteria, storage facilities, concrete works plant, metal fabrication station and welding stations. The Chakvistiskali River flows behind the facility.

Positive Interventions Observed	Main EHS Issues Observed
Good buffer zone between camp and Chakvistiskali River in the camp rear.	Oil drums stored on their sides where oils could drip and contaminate soil.
Septic system secured.	Poor drainage in camp grounds.
Organized indoor storage.	Welders not wearing eye protection (PPE).
HSE Posters displayed on campsite.	Accumulation of scrap material in campsite.

### 3.3.7 Quarry Sites (Gurianta, Meria-Laituri and Gelouri)

Mining continues in the Meria-Laituri Quarry along the Natanebi River, where the material is being transported to the Laituri crushing plant.

Furthermore, aggregate material for the Lot 2 road under construction commenced in a new inland quarry site (about 8 ha in extent) located by the Gelouri and Khutsubani villages belonging to the Kobuleti municipality. The Government of Georgia provided special approval of the Gelouri Quarry through a resolution (No. 2138) for quarry operations over a period of three months, to extract 395,000 m<sup>3</sup> of aggregate material under the supervision of the Ministry of Environment & Natural Resources. Quarry extraction at the Gelouri Quarry ended in December 2013, and the quarry will be reinstated. At the time of the April inspection, the ground was too wet for reinstatement to commence.

The Gurianta Quarry along the Natanebi River has been closed.

Positive Interventions Observed	Main EHS Issues Observed
The Gurianta and Kintrishi quarry sites have been restored.	At the Gurianta Quarry, water in the channel will become stagnant if not connected to the Natanebi River or drained.
Quarry Restoration Plan for Gelouri on site, as well as signed records from geologists approving the practices and remarking that no harmful geological processes occurred.	
Piling of top soil in new inland quarry site in Gelauri for subsequent restoration.	

According to the Decree #1819 (dated August 27, 2015) the Contractor was given permission to extract sand and gravel material without license with three months term at the adjacent territory of vil. Zeda Sameba of Kobuleti Municipality. The permission includes extraction of 198,000m<sup>3</sup> sand and gravel material.

### 3.3.8 Laituri Camp Site and Crushing Plant

A wire mesh production plant has been established in the Laituri camp site to produce wire mesh for gabions.

Positive Interventions Observed	Main EHS Issues Observed
Sediment trap/pond set up to minimize siltation of water entering Natanebi River below crushing plant.	Main trash receptacle close to property border. Trash blows into neighboring property. Trash receptacle should be covered.
Proper storage of compressed gas cylinders.	Used scrap metal and other material scattered in camp site.
	Waste oil stored in uncovered drums. Oil stained dirt, shale, concrete present.

### 3.3.9 Rivers and Streams along Main Road

Environmental assessment of rivers and streams crossing the Lot 2 area was carried out by the International Environmental Specialist (see Annexes IV for summary reports). The Kintrishi and Kinkishi river system in Lot 2 are the main sources of potable water for local communities in Kobuleti. An area of 36 ha located downstream of these rivers is protected as a watershed area, and maintained by Kobuleti Water, Ltd. The Achkva, Dekhva, Shuagele and Chakvistskali Rivers are also included in these summary observations:

Positive Interventions Observed	Main EHS Issues Observed
Water flow of rivers and streams crossing Lot 2 road has been facilitated with temporary culverts.	Rivers in Lot 2 subjected to sedimentation and pollutant runoff from storm water due to earthworks in progress for bridge construction without any measures in place for mitigation.
Sediment ponds created in some bridge construction locations in Lot 2.	Construction debris at the river banks beneath construction of bridges
River/stream banks in Lot 2 rivers stabilized to prevent erosion.	.
Quarterly measurement of surface water quality in Lot 2 rivers.	
Temporary access road in Kintrishi has been removed to facilitate water flow	

### 3.4 Evaluation of HSE Documentation and Record Keeping

The Contractor has shown a significant improvement in HSE documentation and record keeping during the reporting period.

Positive Interventions Observed	Main Issues Observed
<p>Maintenance of an organized systems of HSE documentation and record keeping, to include the following:</p> <ul style="list-style-type: none"> <li>• Environmental quality parameter measurement reports through December 2014 with laboratory analysis;</li> <li>• Due diligence documents (e.g., EMP, Method statements, specific EHS management plans, permits and licenses);</li> <li>• Employee health and safety training records (meetings held every 6 months);</li> <li>• Employee injury/accident logs through December, 2014.</li> <li>• Progress reports;</li> <li>• Construction vehicle accident records and incident investigations;</li> <li>• Quarry Restoration Plan(s).</li> </ul>	<p>Lack of the following documentation/records:</p> <ul style="list-style-type: none"> <li>- Log of used material (tires, scrap metal etc.) hauled offsite for reuse/recycling;</li> <li>- Construction vehicle service logs;</li> </ul>

### 3.5 Evaluation of Environmental Quality Parameter Measurements

Positive Interventions Observed	Main EHS Issues Observed
Noise levels and particulate matter (PM) in air has been tested on a regular basis at predetermined locations.	No measurements made for Sulphur Dioxide, Nitrogen Oxide, and Carbon Monoxide in air.
Baseline noise and PM measurements have been established for Lot 2 area.	No vibration readings have been recorded to date.
	In potable water samples taken in October 2015 from the campsites Bobokvati, Laituri and Chakvi bacterial contamination have been revealed.

### 3.6 Evaluation of General Occupational Health and Safety Practices

Two (2) non-life threatening accidents and one accident causing death were recorded for the period of July – December, 2015. The Contractor has investigated each of these incidents, and taken suitable actions.

Positive Interventions Observed	Main EHS Issues Observed
Warning signs posted at relevant locations (e.g., campsites, road work sites).	Gaps in guard rails allow cattle to cross into road leading to motor accidents.
On-site clinic with first aid medications and a doctor (in Choloki Campsite). First aid medications also available at Bobokvati.	When working many meters from the ground, workers do not wear fall protection lanyards (PPE).

Restroom sanitary conditions improving with addition of soap.	Safety concerns related to electrical safety (e.g., poor wiring, exposed electrical systems, improper grounding etc.).
PPE given to workers to be used during work. Significant improvement in works wearing PPE especially in camp work sites.	No on-site clinic established at Bobokvati Campsite yet.
Safety meetings held on a regular basis to discuss safety issues (every 6 months).	Some workers ignore PPE during work.
Recordkeeping improvement.	
Training on PPE use held for workers.	

### 3.7 General Observations on Biodiversity and Recovery of Disturbed Habitats

According to the Monthly Progress Reports for Lots 1 and 2, no impacts on flora or fauna were documented, nor were any cases of poaching reported in the reporting period.

Topsoil and seeds along Lot 1 embankments have taken root and new vegetation, grasses and weedy species, were observed during the inspection. In some areas along Lot 1, new vegetative growth is rather thin. Thus, additional grass seeding is recommended on some embankments and road islands. In Lot 2, topsoil has been spread on embankments between the Kintrishi and Kinkishi Rivers.

When observing Lot 2 rivers and streams, calls from amphibians were noted. Schools of fish were visible in a small stream near the Achkva River, along the Lot 2 construction zone. The disturbed river channels below the newly constructed Kintrishi and Kinkisha bridges have recovered.

3 Poplar and 13 Cryptomeria trees were at risk of cutting due to arrangement of left slope of road to Bridge #8 (see Pic. #6). By the effort of Supervision team these threes were saved. Despite the fact, that trunks of several trees is covered with sand and gravel, the chance of their survival is high

### 3.3 NON-COMPLIANCE NOTICES

During the course of the construction supervision in the previous six months of the works, a number of “Non-Compliance Notices” were written by the Engineer to the Contractor. Among them are as follows:

**Table 13: Some of the Non-Compliance Notices**

Date	Ref. Number	Subject	Content/Issues
<b>Lot 1 road and related campsites</b>			
02 July. 2015	0358	Concerning strengthening and stabilization of slopes of cut	- Heavy rains caused landslide of slopes. Contractor was instructed to speed up strengthening of those slopes which was considered in the Bidding documentation
02 July. 2015	0359	Concerning trash and used materials	- After the ecological monitoring violation of Georgian law regarding “protection of

Date	Ref. Number	Subject	Content/Issues
			atmospheric air” and “codex of management of used materials” has been revealed. Contractor was instructed to remedy all problems and act according to rules of environment protection.
09 July, 2015	0372	Response to the Contractor’s letter (Ref. No:[2015]GEO-KB2-EN-192)	- Several Environmental issues were solved by the Contractor like disposal of trash material, sorting of scrap, arranging of field toilets and etc.
29 August, 2015	0542	Concerning exploitation and future re-cultivation of new quarry	- Engineer is instructing the Contractor to follow requirements of geo-information package of new quarry
11 September, 2015	0511	Response to the Contractor’s letter (Ref. No:[2015]GEO-KB2-EN-269)	- Engineer is requesting the Contractor to submit quarry restoration plan.
28 October, 15	0570	Concerning re-cultivation of the quarry	- Engineer is requesting the Contractor to act according to submitted detailed re-cultivation plan in order to avoid Administrative offenses.
28 October, 15	0571	Reply to Contractor’s letter #307	- Regarding the issue that the Contractor has fulfilled his obligation to dump 20000m <sup>3</sup> material at the Black sea coastal zone for bank revetment measures.
28 October, 15	0572	Concerning the quality of drinking water at campsites	- Engineer is requesting to the Contractor to clean out the water tank, where dangerous Bacteria has found out.
14 November, 15	0590	Concerning execution of plan for re-cultivation of quarry	- Engineer is requesting to the Contractor to execute recovery of sand-gravel quarry within those dates, which are indicated in the re-cultivation plan.
8 December, 2015	0628	Concerning recovery of inert material quarries	- Engineer gives information to the Contractor regarding dates of finishing re-cultivation of quarry, explaining the negative results, which can be cause by delaying of works. Also, Engineer is instructing how to execute correctly recovering of inert material quarry
16 December,	0643	Concerning pollution of Ochkhamuri	- Oil pollution was observed in Ochkhamuri Campsite and



Date	Ref. Number	Subject	Content/Issues
2015		Campsite by oil	Contractor was requested to remedy the problem ASAP.
26 December, 2015	0654	Concerning partial cancellation of Bobokvati Campsite	- In case of partial closing of Bobokvati camp, Engineer gives to Contractor several instruction regarding remedy of Environmental problems.

### 3.4 CORRECTIVE ACTION PLANS

To resolve the observed issues, the International Environmental Specialist arranged two meetings between the Engineer and Contractor on April 10, 2014, and June 26, 2014 to present an **Environmental Action Plan** to be discussed and implemented. Agreements were reached that the Contractor shall respond to the issues, while the Engineer's environmental specialists shall actively monitor the compliance. A formal commitment was signed between the Engineer and the Contractor to address the HSE issues identified (see Annex 2). Re-inspections were carried out jointly with the Contractor on April 18-19 and July 1-2 to document progress of corrective actions implemented/being implemented. As of the completion of this report the resolutions of the said issues were as follows:

**Table 14: Actions Taken Against Identified EHS Issues (July-December 2015)**

Location	Environmental Health and Safety Issues	Action Taken
Section 1 Main Road (0.0-12.4 km)	- Gaps in guard rails allows the entry of cattle onto road	➤ Contractor discussed with Roads Dept. to extend guardrails.
	- Construction debris remaining at bridges, asphalt in rivers.	➤ Partially addressed.
	- Exposed embankment and some road islands needing additional grass seeding.	➤ Complied with.
	- Dust emissions from construction work along roads.	➤ Spraying of water along the road should be implemented during dry weather days
	- Incorporating scaffolding, fall protection when working at high spaces.	➤ Workers started to wear lanyards.
Lot 2 Main Road	- PPE issues	➤ The Contractor provided PPE to the workers and also training was held on
Choloki Campsite	- Garbage/trash management issues	➤ Initiated.
	- Drains/ditches clogged, and stagnant water	➤ Partially cleared.
	- Material storage issues including offsite hauling of scrap metal/wooden planks	➤ Initiated.
	- Water leak in kitchen potable water tank	➤ Water leak repaired.
Laituri Crushing Plant	- Garbage and rubbish found in a number of places in the premises.	➤ Initiated.



Location	Environmental Health and Safety Issues	Action Taken
	– Presence of scrap metal scattered in camp	➤ Progress made.
	– Open drums with waste oil.	➤ Progress made.
	– Oil stains present under machinery.	➤ Progress made.
	– Sediment pond filled with sediment.	➤ Progress made.
Bobokvati Camp Site	– Garbage/trash management issues	➤ Cleaned.
	– Lack of a designated area with concrete pad for refueling of vehicles	➤ Established.
	– Oil stained dirt.	➤ Complied with.
Ochkhamuri Camp Site	– Bitumen bags are stored outdoor in open	➤ Storage has been constructed
Chakvi Camp Site	– Lack of trash cans	➤ Progress made.
	– Mud and debris clogging drain system.	➤ Progress made.
	– Material storage issues.	➤ Initiated.

These issues were captured in project photos and shown in Annex I, where positive actions implemented are in green, while those in red depict HSE issues yet to be addressed. Some of these issues were already complied with by the Contractor. The local environmental specialists should conduct continuous HSE monitoring of sites and report to the Engineer without delay any evidence of non-conformance.

For the pending issues further recommendations are as follows:

**Table 15: Recommendations to Address HSE Issues**

Recommendations	Responsible Party
<b>Main Road (Lot 1 &amp; Lot 2)</b>	
Top soil removed from Lot 2 area should be stockpiled in designated places outside drainage lines and private lands outside of right-of-way, and monitored in accordance with Lot 2 EMP Annex 9.1 Environmental Code of Practices (ECP) # 7. Remove all roots and scrubby plants from topsoil prior to replacement.	Contractor to perform physical interventions; Engineer to monitor progress.
Extend guard rails throughout Lot 1 road to avoid cattle related vehicle accidents.	Roads Department to fund. Contractor to install guardrails.
Stabilize steep cut slopes with berms, biomats and/or vegetation cover.	Contractor to implement physical interventions. Engineer to monitor progress.
Install safety netting on either side of bridges and viaducts across existing roads	Contractor to set up safety netting. Engineer to monitor progress.
<b>Camp Sites (Choloki, Ochkhamuri, Laituri, Bobokvati and Chakvi)</b>	
Drainage should be improved by regular maintenance of drains, ditches in campsite, paving of roads inside camps and spreading sand/gravel to eliminate ponding/puddling of water.	Contractor; Engineer to perform weekly inspections
Regular management of waste, in accordance with the EMP ECP # 1 (Waste Management). The practice of burning waste in campsites should be stopped, in accordance with the EMP.	Contractor; Engineer to perform weekly inspections
Proper storage of material (used and unused), with special attention to storage of oil drums and compressed cylinders.	Contractor; Engineer to perform weekly

	inspections
Used material (scrap metal, tires etc.) should be hauled offsite for recycle/beneficial reuse on a regular basis. Records of material hauled offsite for recycling and/or beneficial reuse should be maintained.	Contractor; Engineer to perform monthly inspections
Metal dust accumulated in metal work sites should be collected into closed containers and disposed offsite.	Contractor; Engineer to perform weekly inspections
Clean oil spills, waste oil drums should be closed, and placed in a concrete pad.	Contractor; Engineer to perform weekly inspections
<b>Quarry Sites</b>	
Quarry sites where extraction of material has been completed should be restored in a proper manner. The new inland quarry site in Gelouri should be restored after extraction to facilitate agriculture by local communities.	Contractor; Engineer to perform inspections during and after restoration.
<b>Rivers and Streams Along Main Road</b>	
Provide refuse containers / bins in bridge construction sites to collect construction debris and trash. Remove constriction debris from Kintrishi river.	Contractor; Engineer to perform monthly inspections.
Establish silt fences/sediment traps/sediment ponds along the river banks subjected to earthwork/bridge construction activities in Lot 2, in accordance with Lot 2 EMP ECP 3 (Water Resource Management) and ECP 6 (Erosion and Sediment Control).	Contractor; Engineer to monitor
<b>HSE Documentation and Recordkeeping</b>	
The following documentation/records should be initiated and maintained on site: <ul style="list-style-type: none"> <li>- Log of used material (tires, scrap metal etc.) hauled offsite for reuse/recycling.</li> <li>- Vehicle maintenance and accident records (already initiated but must be maintained).</li> </ul>	Contractor; Engineer to perform monthly reviews.

### 3.5 Consultations and Complaints

#### EHS Issues Reported through the Grievance Redress Mechanism (GRM) Process

The villagers of Bobokvati made a formal complaint regarding severe dust emissions related to construction of Bridge #7 and associated roadsides, resulting in adverse effects in their households. The villagers held a protest on June 26<sup>th</sup> along the roadside of affected areas, and requested the Contractor to take immediate actions to reduce dust emissions. The environmental specialist also discussed this issue with the Contractor's EHS Director, and requested them to spray water in these construction sites bordering residential areas on 2-3 times daily to minimize dust emissions. The Contractor agreed to implement this action as a matter of priority.

#### EHS Issues Raised by Local Authorities

No documented environmental health and safety issues were raised by local authorities during the reporting period.

#### **PART IV – Action Plan for the Next Period**

1. Final Audit Environmental Report for Lot 1 and Lot 3 - will be submitted to ADB by the end of February 2016.
2. Adequate attention will be continued for top-soil management, reinstatement work and slope stabilization – February-June 2016.
3. Preparation of Company Waste Management Plan (according to new GEO legislation) to be submitted to MoENRP for approval – June 2016.

# ANNEXES

## I. PROJECT PHOTOS